IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

The Desert Review – Coachella to remain chilly: https://www.desertsun.com/story/weather/2015/11/27/weather-palm-springs-coachella-valley/76458396/

October 4, 2015
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

FINAL REPORT

October 4, 2018

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ACRONYM	DESCRIPTIONS
AOD	Aerosol Optical Depth
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HC	Historical Concentrations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
INPEE	Initial Notification of a Potential Exceptional Event
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP/PSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
LST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MODIS	Moderate Resolution Imaging Spectroradiometer
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration
nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service

PDT	Pacific Daylight Time
PM_{10}	Particulate Matter less than 10 microns
$PM_{2.5}$	Particulate Matter less than 2.5 microns
PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan
SSI	Size-Selective Inlet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WRCC	Western Regional Climate Center

I Introduction

On October 4, 2015, State and Local Ambient Air Monitoring Stations (SLAMS) located in Brawley (AQS Site Code 06-025-0007) and Westmorland (AQS Site Code 06-025-4003), California measured exceedances of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM) Beta Attenuation Monitor Model 1020 (BAM 1020) measured (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM_{10}) concentrations of 166 µg/m^3 and 250 µg/m^3 (**Table 1-1**). PM_{10} 24-hr measurements measured above the 150 µg/m^3 are exceedances of the NAAQS. The SLAMS in Brawley and Westmorland were the only monitors to measure an exceedance of the PM_{10} NAAQS on October 4, 2015.

TABLE 1-1
CONCENTRATIONS OF PM_{10} ON OCTOBER 4, 2015

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m^3	PM_{10} NAAQS µg/m^3
10/4/2015	**Brawley**	**06-025-0007**	**3**	**24**	**166**	**150**
10/4/2015	**Westmorland**	**06-025-4003**	**3**	**24**	**250**	**150**
10/4/2015	Niland	06-025-4004	3	24	110.8	150
10/4/2015	El Centro	06-025-1003	3	24	45.7	150

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted[1]
October 4, 2015 was not a scheduled run day - no continuous monitoring available at the Calexico station

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM_{10} data from Federal Reference Method (FRM) Size-Selective Inlet (SSI) instruments since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013, all continuous measured PM_{10} data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM_{10} data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM_{10} data since 2013 is regulatory. On October 4, 2015, the Brawley and Westmorland monitors were impacted by elevated particulate matter caused by the entrainment of fugitive windblown dust from high winds generated from a strong and cold low-pressure system that moved inland towards Arizona from the Southern California coast.

This report demonstrates that a naturally occurring event caused an exceedance observed on October 4, 2015, which elevated particulate matter and affected air quality. The report provides concentration to concentration monitoring site analyses supporting a clear causal relationship between the event and the monitored exceedances and provides an analysis supporting the not

[1] According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use the designation can be left off inferring "local time" daylight or standard whichever is present. For 2015, Pacific Daylight Time (PDT) is March 8 through November 1. https://www.nist.gov/pml/time-and-frequency-division/local-time-faqs#intl

reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides information that the exceedances would not have occurred without the entrainment of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude PM_{10} 24-hour NAAQS exceedances of 166 $\mu g/m^3$ and 250 $\mu g/m^3$ (**Table 1-1**) as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)[2].

I.1 Demonstration Contents

Section II - Describes the October 4, 2015 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the event affected air quality. Overall, this section provides the evidence that the event was a natural event.

Section III – Using time-series graphs, summaries and historical concentration comparisons of the Brawley and Westmorland stations this section discusses and establishes how the October 4, 2015 event affected air quality demonstrating that a clear causal relationship exists between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM_{10} data measured in both local conditions and standard conditions. Measured PM_{10} continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the October 4, 2015 event and its resulting emissions defining the event as a “natural event”.[3]

Section IV - Provides evidence that the event of October 4, 2015 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section V - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

I.2 Requirement of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

[2] "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

[3] Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The ICAPCD published the National Weather Service (NWS) forecast synopsis from the San Diego and Phoenix offices. The San Diego office described a low-pressure system from the north moving into Southern California. The system was expected to bring numerous showers that would decrease by Monday. The San Diego NWS office forecasted gusty southwest to west winds 23 to 34 mph along desert slope and into adjacent desert areas. The Phoenix office described a strong and relatively cold Canadian low-pressure system deepening south toward Central California resulting in afternoon gusty south winds for the service areas. Because of the potential for suspended particles and poor air quality, the ICAPCD issued a "No Burn" day in Imperial County. **Appendix A** contains copies of pertinent notices to the October 4, 2015, exceptional event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. Notification occurs when an agency submits a request, which includes an initial event description, for flagging data in AQS.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an “Initial Notification of Potential Exceptional Event” (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured PM_{10} concentration from the Brawley and Westmorland monitors on March 7, 2016. Subsequently there after the ICAPCD sent a revised request on March 18, 2016 providing additional information describing the event. **Table 1-1** above provides the correct concentration for Brawley and Westmorland. The difference in concentrations between local and standard has an insignificant impact on any data analysis. The submitted request included a brief description of the meteorological conditions for October 4, 2015 indicating that a potential natural event occurred.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on April 20, 2018. The published notice invited comments by the public regarding the request, by the ICAPCD, to exclude the measured concentrations of 166 μg/m^3 and 250 μg/m^3 (**Table 1-1**), which occurred on October 4, 2015 in Brawley and Westmorland. The final closing date for comments was May 21, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(a)(1-2))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County continue to discuss any potential documentation of events.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the October 4, 2015 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR§50.14(c)(3)(iv))

A This demonstration provides evidence that the event, as it occurred on October 4, 2015 satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.

- a The event created the meteorological conditions that entrained emissions and caused the exceedance.
- b The event clearly "affects air quality" such that there is the existence of a clear causal relationship between the event and the exceedance.
- c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
- d The event "is not reasonably controllable and not reasonably preventable."
- e The event is "caused by human activity that is unlikely to recur at a particular location or [is] a natural event."
- f The event is a "natural event" where human activity played little or no direct causal role.

B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentrations in Brawley and Westmorland.

C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitors.

II October 4, 2015 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the October 4, 2015 event unfolded in Imperial County. The subsection elements include:

» A description and map of the geographic setting of the air quality and meteorological monitors
» A description of Imperial County's climate
» An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (**Figure 2-1)**. The Colorado Desert not only in includes Imperial County but a portion of San Diego County.

FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY

Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2)**. In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA

Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6)**. Together, the incorporated cities, including Niland, and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter) mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back county with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that can be seen while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK

Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS

Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Gorgonio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that impact Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT

Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

FIGURE 2-6
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

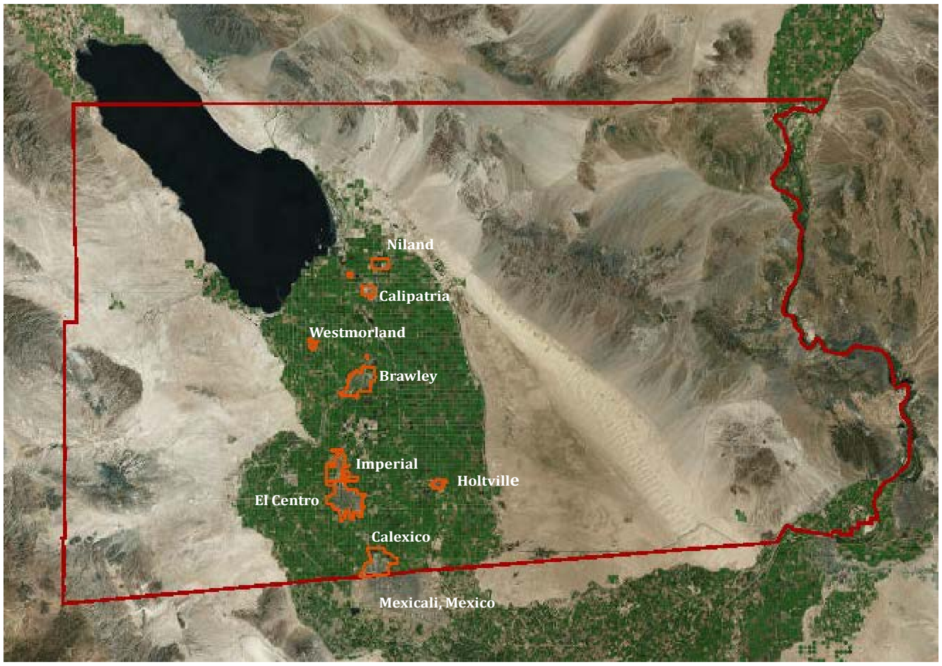


Fig 2-6: Depicts the seven incorporated cities within Imperial Valley - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, and the City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south

FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

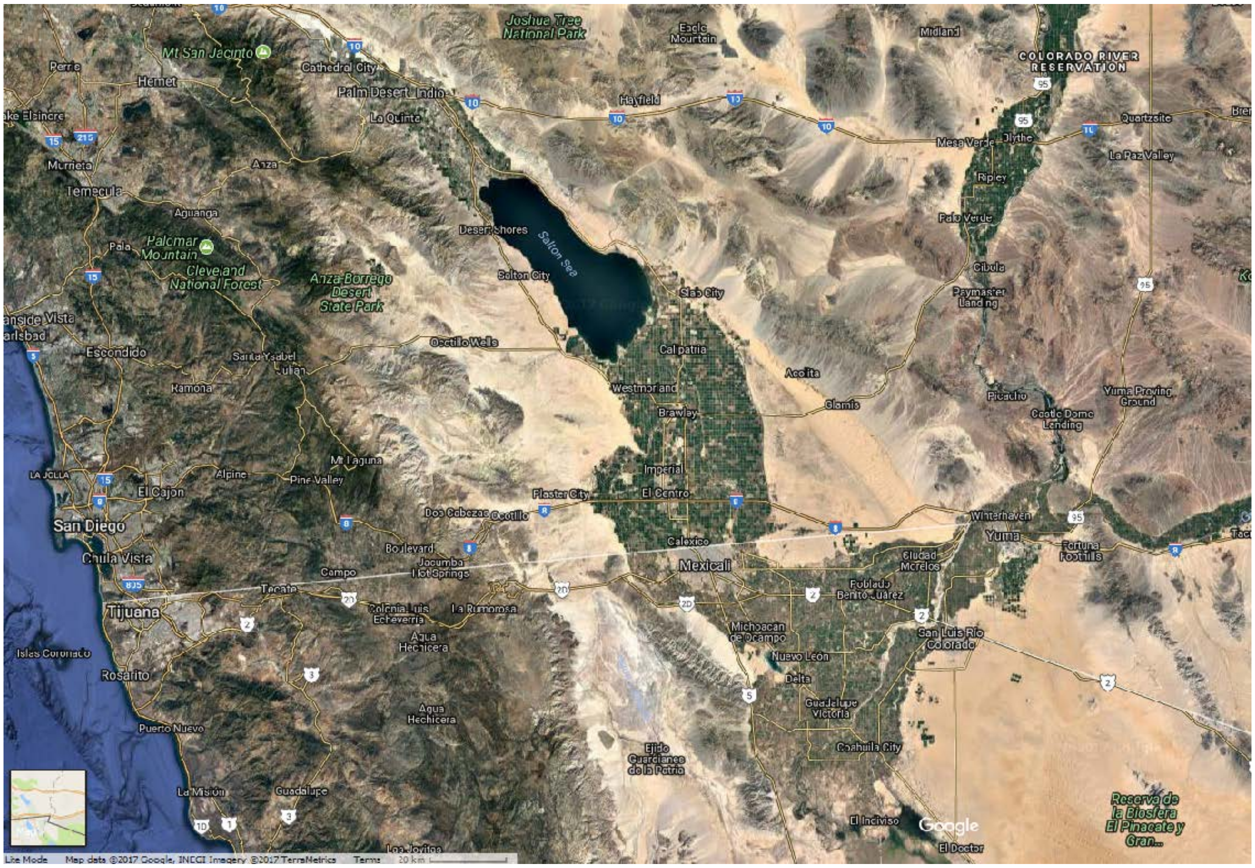


Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County. Source: Google Earth Terra Matrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County, four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1)**.

As mentioned above, the PM_{10} exceedance on October 1, 2015 occurred at the Niland station. The Brawley, Niland and Westmorland stations are regarded as the "northern" monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on October 1, 2015 other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8)**.

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

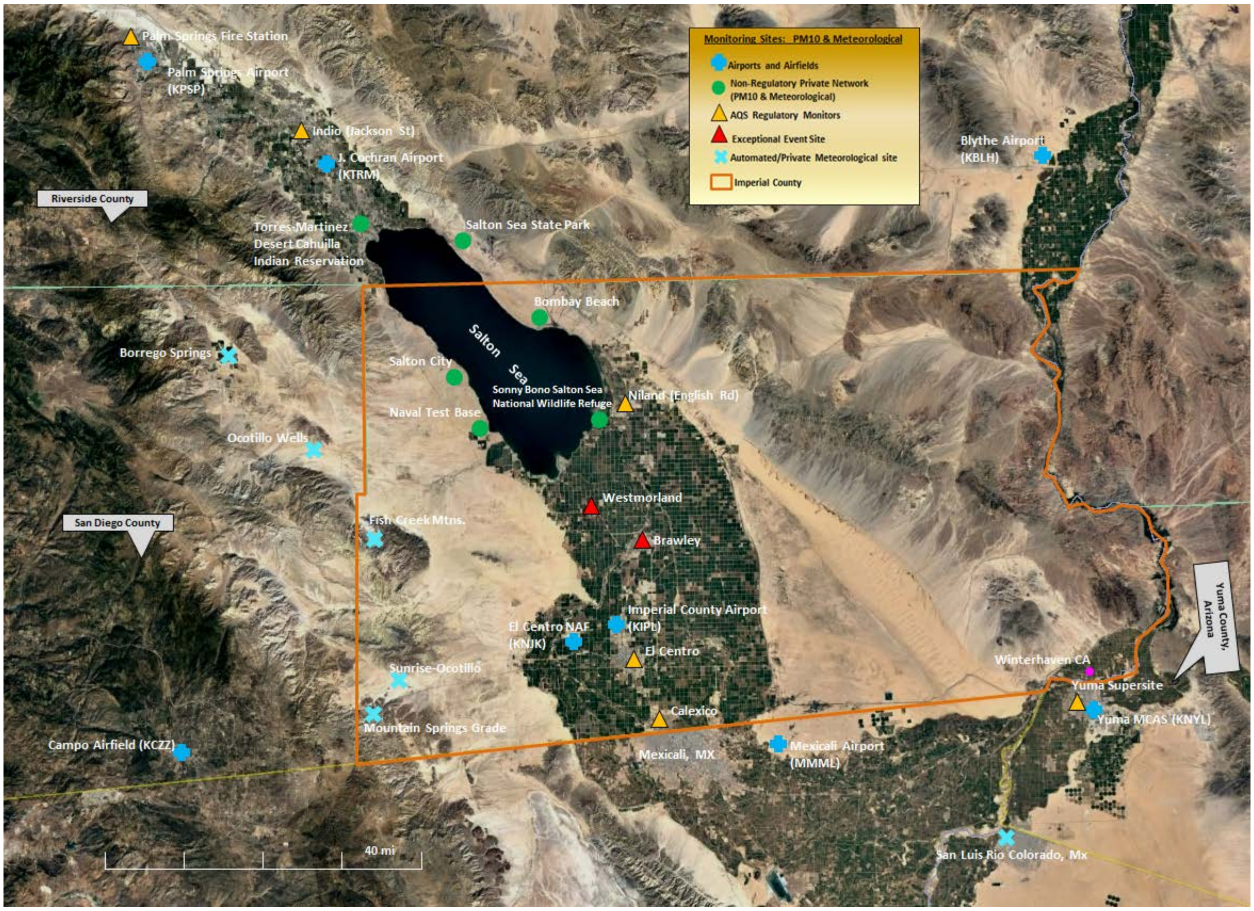


Fig 2-8: Depicts a select group of meteorological and PM_{10} monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support of an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM_{10} sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These privately owned stations are non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062˚W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593˚W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310˚W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. View site photos at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST

Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION

Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION
WEST

Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION

Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

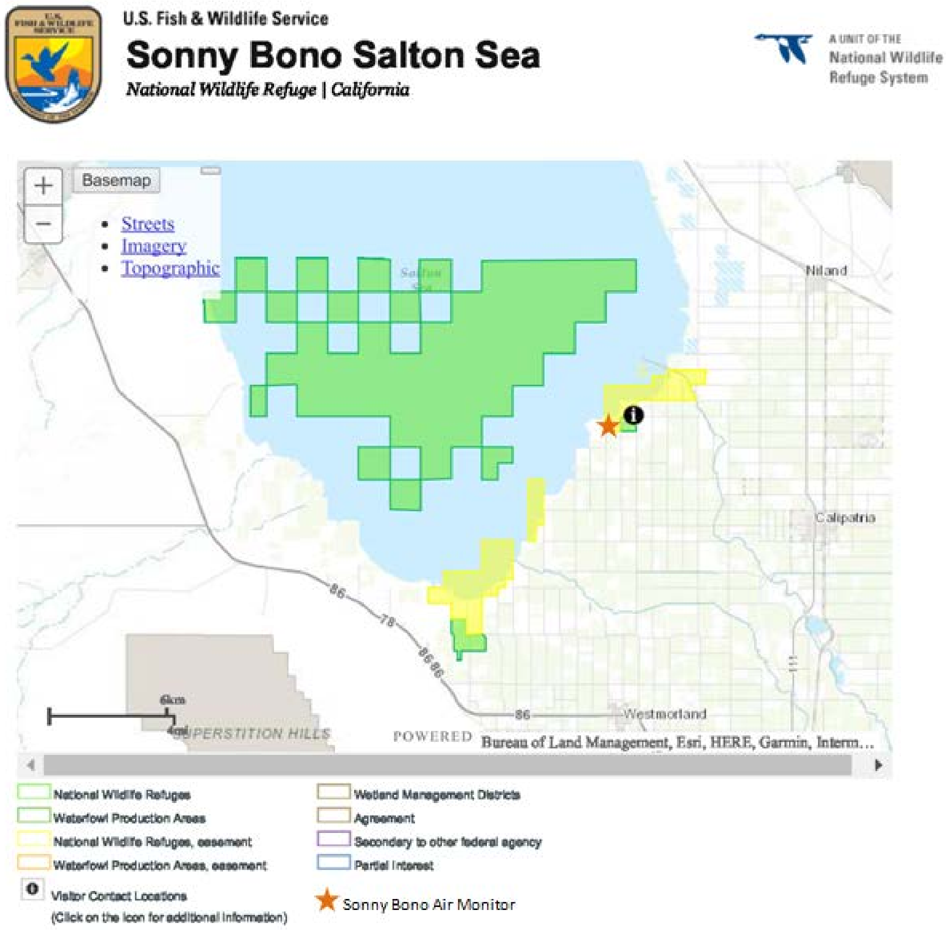


Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
OCTOBER 4, 2015

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	24-hr PM_{10} (µg/m³) Avg	1-hr PM_{10} (µg/m³) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY											
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	(81102)	13701	-15	-	-	-	-	-
		BAM 1020					166	624	1900		
Calexico-Ethel Street	CARB	Hi-Vol Gravimetric	06-025-0005	(81102)	13698	3	-	-	-	-	-
El Centro-9th Street	ICAPCD	Hi-Vol Gravimetric	06-025-1003	(81102)	13694	9	-	-	-	11.5	1700
		BAM 1020					45	210	0900		
Niland-English Road	ICAPCD	Hi-Vol Gravimetr	06-025-4004	(81102)	13997	-57	-	-	-	19.4	1700
		BAM 1020					110	477	1600		
Westmorland	ICAPCD	Hi-Vol Gravimetric	06-025-4003	(81102)	13697	-43	-	-	-		
		BAM 1020					250	963	0500	11.2	1900
RIVERSIDE COUNTY											
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	11	24	0200	-	-
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	21	81	1300	-	-
ARIZONA – YUMA											
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	108	442	2000	-	-

*CARB = California Air Resources Board
*ICAPCD = Air Pollution Control District, Imperial County
*SCAQMD = South Coast Air Management Quality District
*ADEQ =Arizona Department of Environmental Quality

***Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km^2). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION

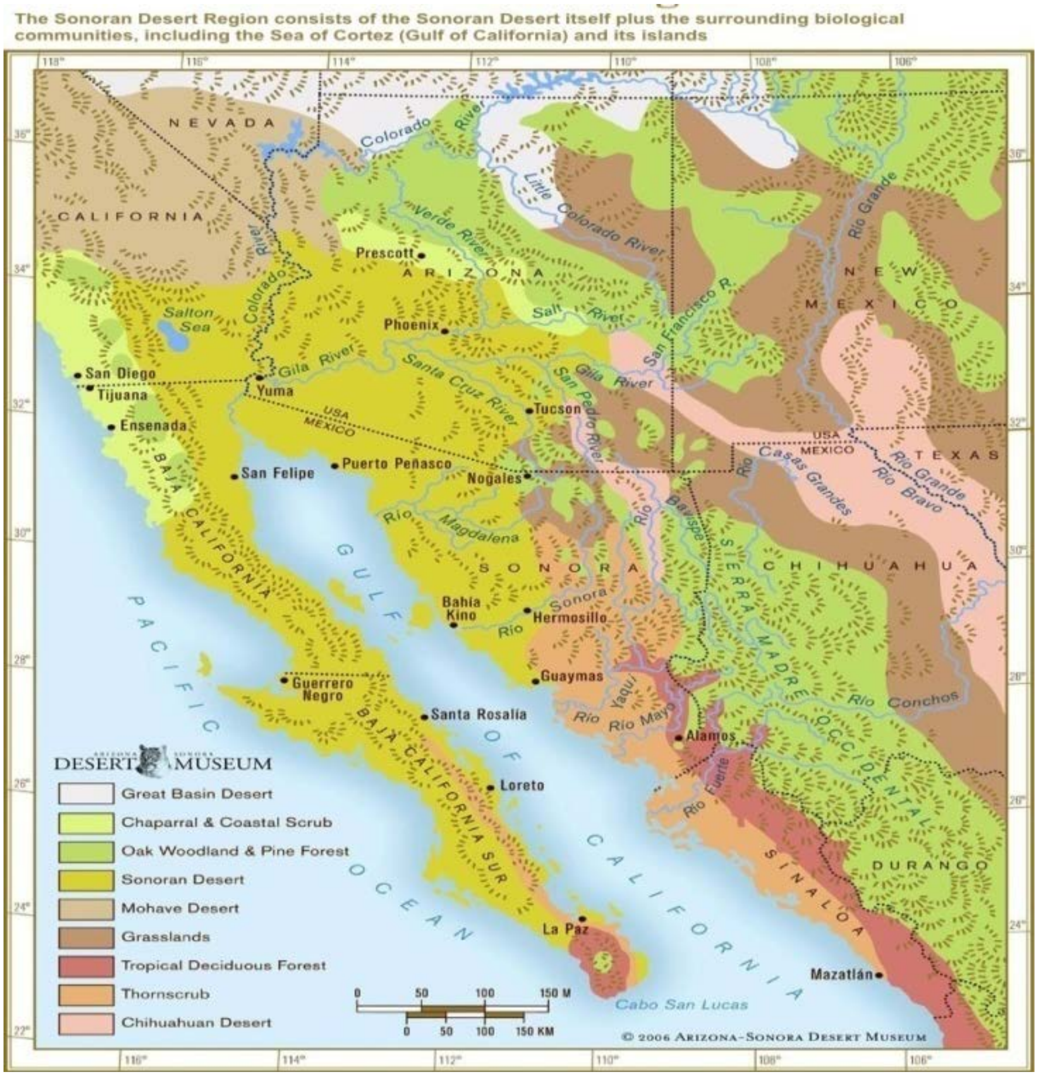


Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at http://desertmuseum.org/center/map.php

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historic annual average precipitation levels in Imperial County average 3.11” (**Figure 2-16)**. During the 12-month period prior to October 4, 2015, Imperial County recorded total annual precipitation of 1.97 inches. Such arid conditions, as those preceding the event, result in soils that are particularly susceptible to particulate suspension by the elevated gusty winds.

FIGURE 2-16
IMPERIAL COUNTY HISTORICAL WEATHER

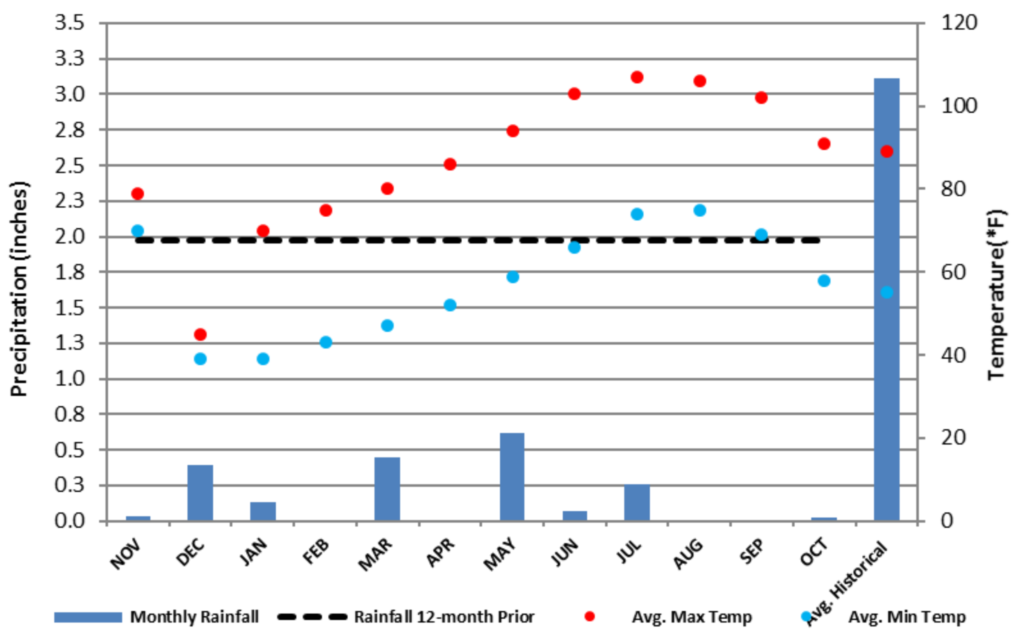


Fig 2-16: Historical Imperial County weather. Prior to October 4, 2015 the region suffered abnormally low total annual precipitation of 1.97 inches. Average annual precipitation is 3.11 inches. Meteorological data courtesy of Western Regional Climate Center (WRCC) and Weather Underground https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2713

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.[4] Because the pressure gradient is just the difference in pressure between high and low pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. These strong winds entrain dust into the atmosphere and transport it over long distances, especially when soils are arid.

II.3 Event Day Summary

The exceptional event for October 4, 2015, caused by a second cold and stronger low-pressure system (upper low) from Western Canada that moved down into Southern California then inland towards Arizona, brought gusty southwest to west winds along the San Diego mountain slopes and deserts and into Imperial County. The strong upper level low-pressure system was expected to bring widespread showers and isolated thunderstorms to the mountains along with strong gusty winds. The San Diego NWS office discussed the reports of numerous wind gusts of 30-35 mph in their area forecast discussion issued at 1230pm PST (130pm PDT). Preliminary storm precipitation reports identified precipitation totals within several mountain areas including the San Diego Mountains, Riverside County (Inland Empire) and Coachella Valley. Similarly, the Phoenix NWS office reported thunderstorm activity along Central Arizona as early as 522pm PST (622pm MST) with possible winds in excess of 30 mph. By 751pm PST (851pm MST) the Phoenix NWS office identified isolated showers moving northward through Gila County and by 8:30pm PST (930pm MST) identified the strongest showers occurring from the North part of the Inland Empire to Cajon Pass.

[4] NWS JetStream – Origin of Wind http://www.srh.noaa.gov/jetstream/synoptic/wind.html

On October 4, 2015, as the second of two low-pressure systems moved eastward across the western states gusty westerly winds blew over and through the San Diego mountains and deserts and into Imperial County affecting air quality and causing an exceedance at the Brawley and Westmorland monitors.

Figures 2-17 through 2-19 provide information regarding the position of the low-pressure trough, cold front and resulting gusty westerly winds as the weather system moves down the California coast.

FIGURE 2-17
UPPER LEVEL LOW APPROACHES SOUTHERN CALIFORNIA

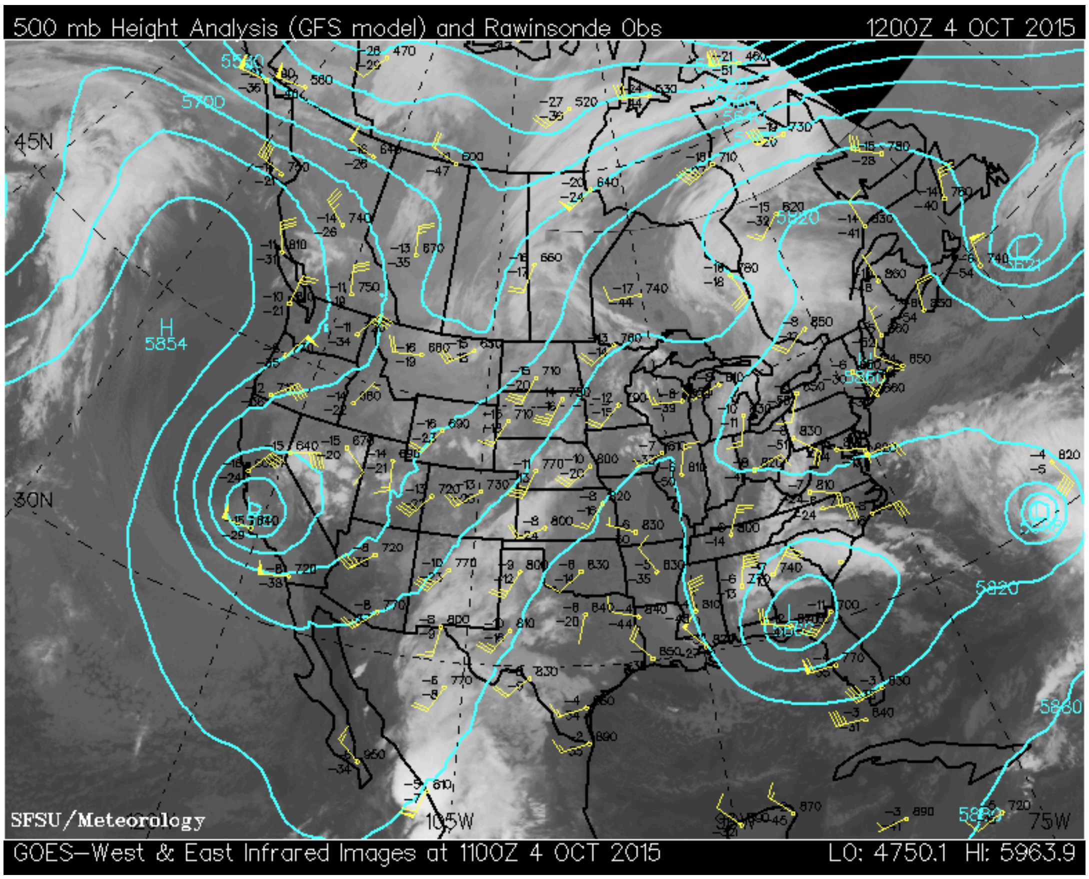


Fig 2-17: A GOES E-W infrared satellite image (0300 PST) showing the upper level low at the 500mb height level as it began to move inland over central California. The system in turn drove a surface low over the region. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server

FIGURE 2-18
SURFACE ANALYSIS MAPS

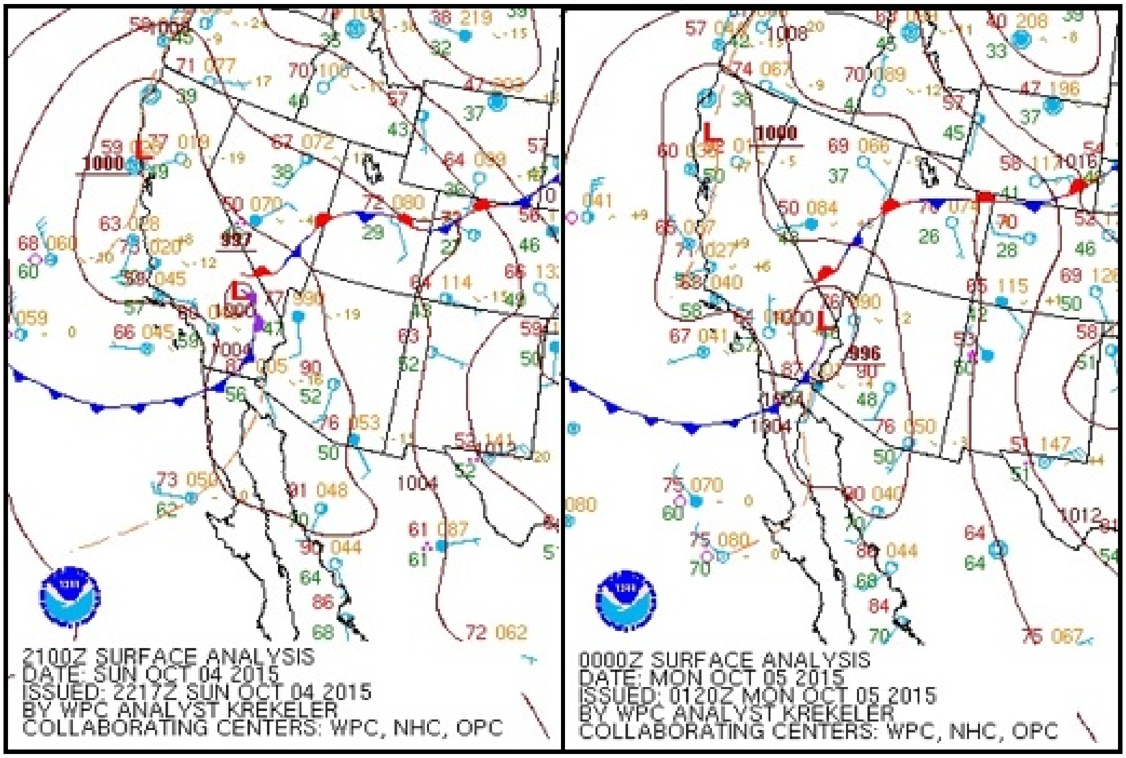


Fig 2-18: A pair of surface analysis maps at 1300 PST (left) and 1600 PST (right) on October 4, 2015, showing the surface low moving southeastwardly through the region, along with a robust cold font. Source: NWS Surface Analysis Archives

FIGURE 2-19
GOES-W VISIBLE SATELLITE IMAGE OCTOBER 4, 2015

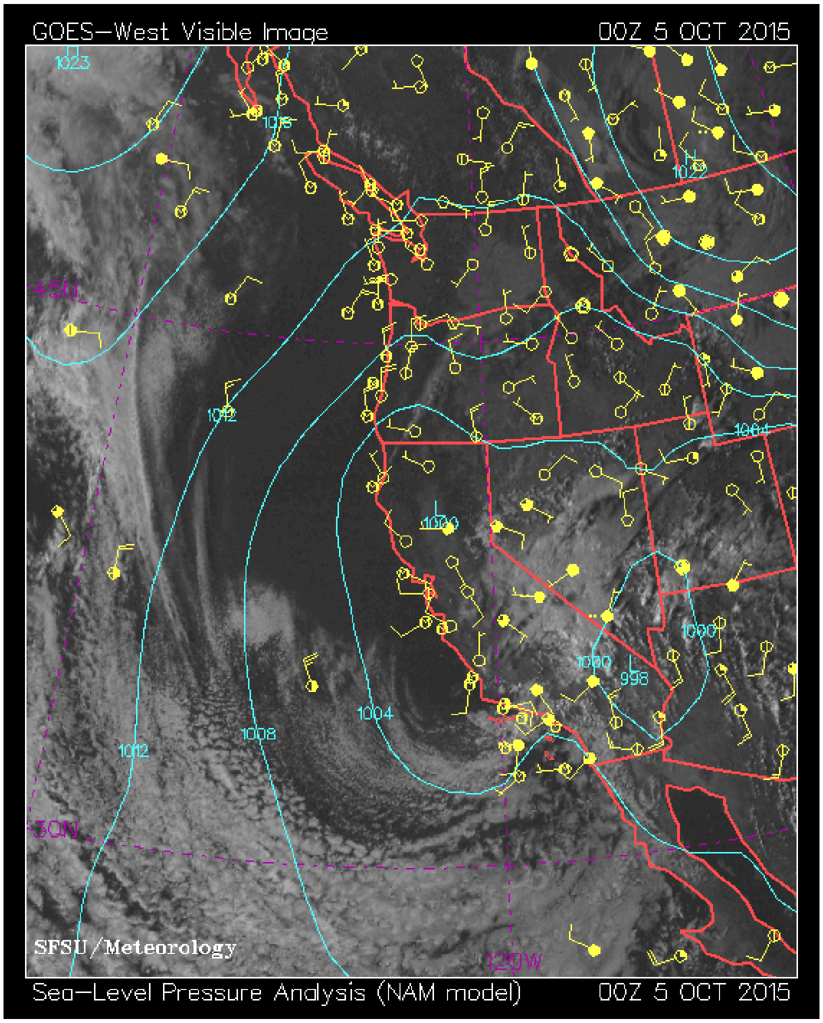


Fig 2-19: A sea-level pressure analysis GOES-W satellite image captured on October 4, 2015 at 1600 PST. The surface low positioned over the CA-NV-AZ border. A wind barb indicates that winds over the Imperial County area were westerly at ~17.3 mph. However, actual winds were higher. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/wcsathts_arch.html

Review of NWS area forecast discussions written as early as September 30, 2015 by the San Diego and Phoenix offices describe a well-defined upper low dropping southward into Southern California. While both NWS offices agreed that, a second system would bring cooling and chances for rain affecting Southern California on Sunday, October 4, 2015, both NWS offices identified slightly different influences. The San Diego NWS office identified strong gusty west winds across the mountains coincident with the movement of the low east across central California and the trough passage across Southern California. The San Diego NWS office identified two waves of discernible energy within the 200am PST (300am PDT) area forecast discussion. The first wave would arrive early Sunday morning not only with enough energy to lift up the marine layer to produce showers along coastal slopes but with gusty winds in parts of the mountains and deserts. The first wave would drift east by Sunday evening. The second wave of showers would move through Monday evening. The Phoenix NWS office made a couple of observations, first that a number of smaller shortwaves around the Canadian low-pressure indicated a slow moving trough allowing for more appreciable remnant monsoon moisture to surge north and west of Arizona. The second observation explained that significant moisture advection north into south central Arizona would be a little slower because of the dry air from the west flowing across Central and Northern Baja allowing for greater chances of showers on Monday. This created favorable conditions for moderate gusty winds with possible blowing dust within the lower deserts Sunday, October 4, 2015. Finally, both NWS offices reported measurable rain and/or thunderstorm activity.

Locally, both airports measured elevated wind speeds with the El Centro Naval Air Facility (NAF)(KNJK) measuring consistently higher than the Imperial County Airport (KIPL). The El Centro NAF measured 23 hours of elevated winds speeds 14 to 25 mph while the Imperial County airport measured 19 hours of elevated wind speeds 10 to 23 mph. Both airports measured wind gusts 22 mph to 30 mph. El Centro NAF measured wind gust as early as 0856 hours (PST) while the Imperial Airport measured wind gust as early as 1353 hours (PST). Other sites, such as the Mountain Springs Grade site, measured 24 hours of elevated wind speeds 10 mph to 31 mph and gusts 26 mph to 46 mph. In addition, measured gusts at several sites within the mountain and desert slopes of San Diego measured at or above 25 mph. **Figure 2-20** is a graphical illustration of the conditions that existed for the October 4, 2015 event.

FIGURE 2-20
RAMP UP ANALYSIS OCTOBER 4, 2015

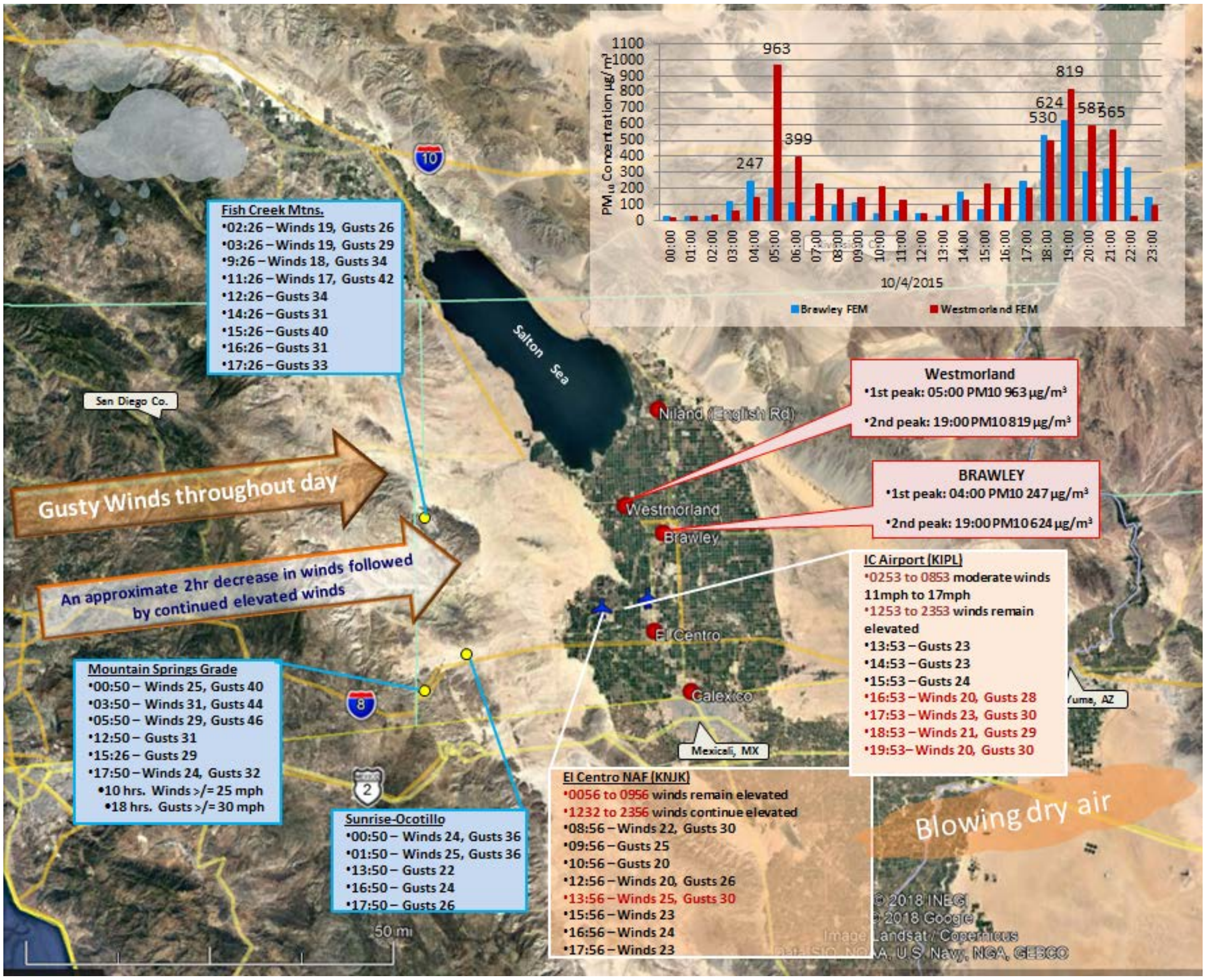


Fig 2-20: Meteorological conditions as described by both the San Diego and Phoenix NWS offices for October 4, 2015. Local airports measured moderate winds throughout the day with two to three hours measuring a brief decrease in winds generally between 10am and noon. As the weather system moved inland and east towards Arizona winds increased during the afternoon to evening hours. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system. Google Earth base map

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON OCTOBER 4, 2015

Station Monitor Airport Meteorological Data	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	*Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM10 correlated to time of Max Wind Speed Brly	Wstmd	Nlnd
IMPERIAL COUNTY								
Imperial Airport (KIPL)	23	280	1753	30	1753	240	204	215
Naval Air Facility (KNJK)	25	270	1356	30	856 1356	28	90	83
Calexico (Ethel St)	-	-	-	-	-	-	-	
El Centro (9th Street)	11.5	289	1700	-	-	240	204	215
Niland (English Rd)	19.4	258	1700	-	-	240	204	215
Westmorland	11.2	273	1900	-	-	624	819	16
RIVERSIDE COUNTY								
Blythe Airport (KBLH)	25	180	1052	33	1052	45	212	423
Palm Springs Airport (KPSP)	18	330	953	31	1453	112	147	353
Jacqueline Cochran Regional Airport (KTRM) - Thermal	17	120	1152	25	1252	60	126	83
ARIZONA - YUMA								
Yuma MCAS (KNYL)	25	160	1157	31	1157	60	126	83
MEXICALI - MEXICO								
Mexicali Int. Airport (MXL)	17.3	310	1700	-	-	240	204	215

*All time is in PST unless otherwise stated

National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory model,[5] **Figures 2-22 and 2-23**, illustrate the path of airflow as it travelled from the mountains and natural open desert areas ending at 0500 PST, 1100 PST, 1900 PST and 2300 PST.

Figure 2-22 includes a 10-hour (top images) and 12-hour (bottom image) back-trajectory ending at 0500 and 1100 on October 4, 2015. The 0500 PST hour represents the morning hourly peak concentration as measured at the Westmorland monitor while the 1100 PST hour represents the last measured elevated concentration at the Westmorland monitor during the am hours. **Figure 2-21** note the slight north influence upon the El Centro monitor during the lowest measured wind speeds at the El Centro station. This accounts for the lower level of measured concentrations at the El Centro monitor on October 4, 2015.

[5] The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's MODIS satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

FIGURE 2-21
EL CENTRO WIND ROSE

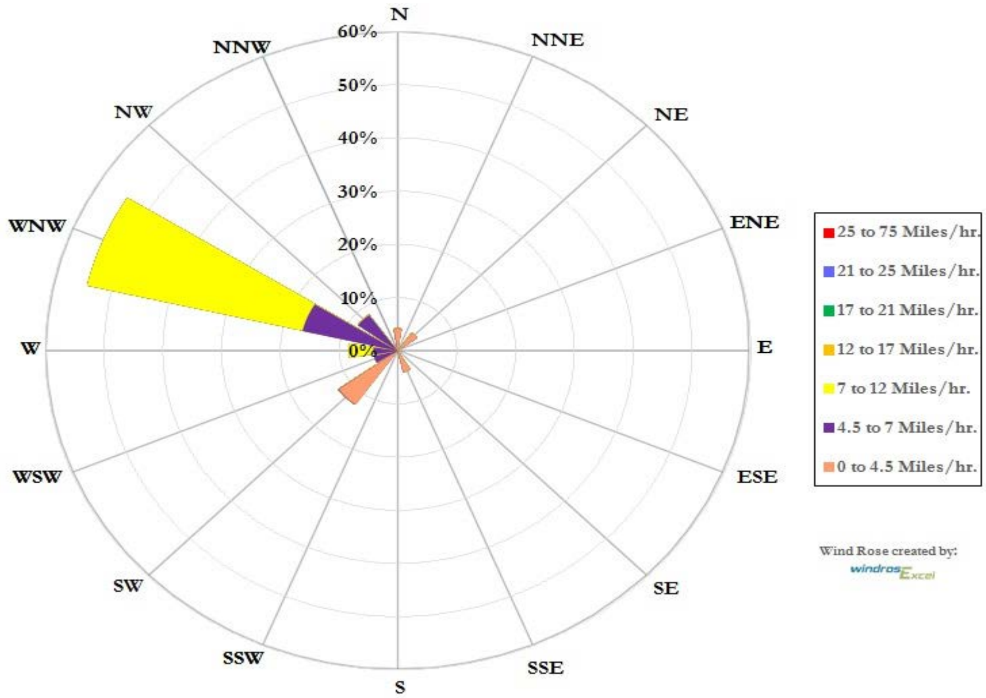


Fig 2-21: The El Centro station windrose confirms the northerly influence upon the airflow on October 4, 2015. As winds travelled over developed urbanized areas winds decreased allowing for less deposition onto the El Centro monitor

Figure 2-23 includes a six-hour (top image) and a 12-hour (bottom image) back-trajectory ending at 1900 PST and 2300 PST on October 4, 2015. The 1900 PST hour represents the afternoon hourly peak concentration at measured at the Westmorland and Brawley monitors. The 2300 PST hour represents the end of the day. The predominant west direction of the airflow is coincident with the highest measured wind speeds during the afternoon to evening hours. This is consistent with the descriptions given by the NWS offices indicating the movement of the system towards Arizona late Sunday and early Monday morning. It should be noted that modeled winds can differ from local conditions. Data used in the HYSPLIT model has a horizontal resolution of 12 km and is integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions.

The winds preceding the system blew over the mountains transporting windblown dust into natural open areas in Riverside and Imperial County affecting air quality throughout southeastern California and southwestern Arizona and causing an exceedance at the Brawley and Westmorland monitors.

FIGURE 2-22
HYSPLIT BACK TRAJECTORY MODEL ENDING 0500 PST AND 1100 PST

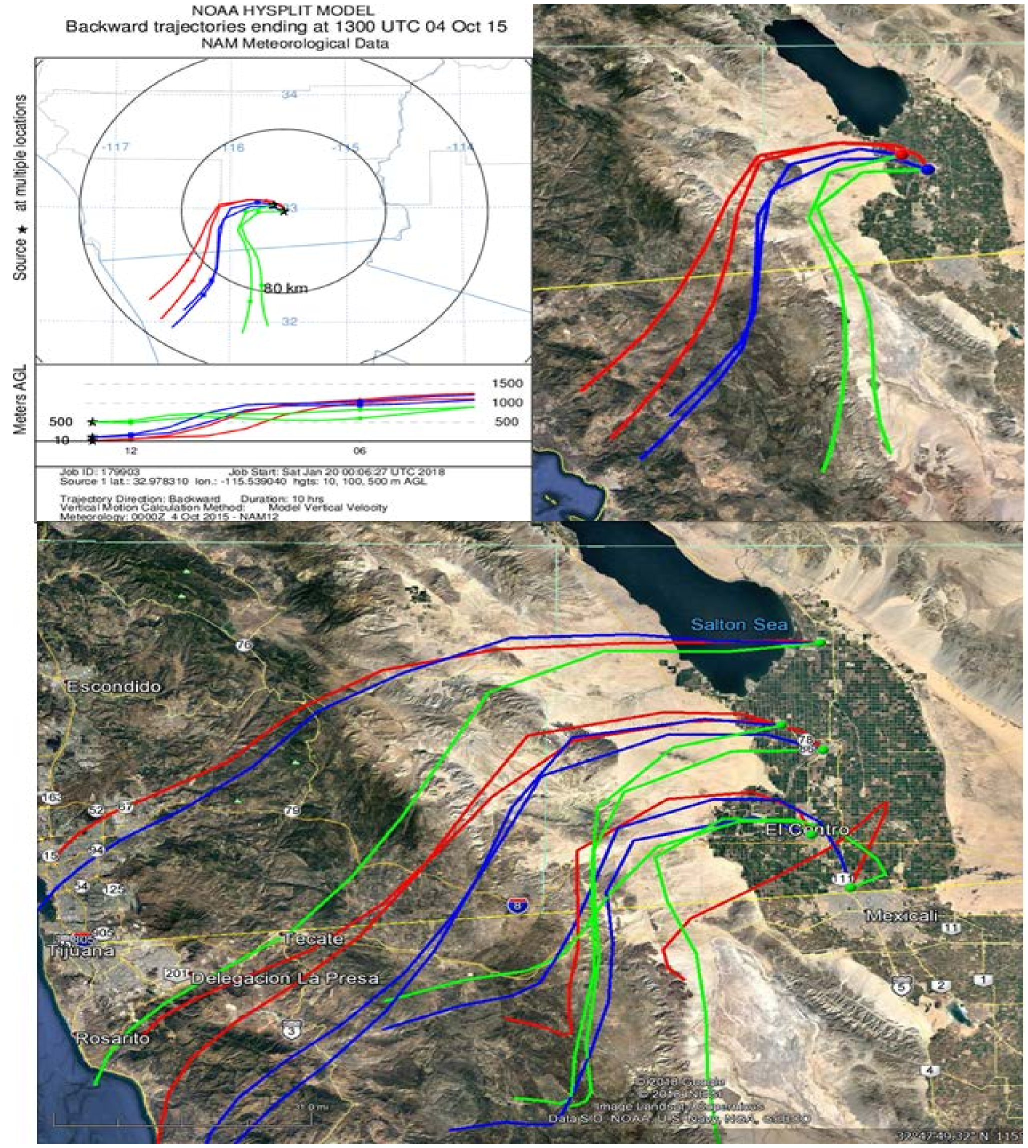


Fig 2-22: Two HYSPLIT back trajectories ending at 0500 PST, coincident with the morning peak concentration at the Westmorland monitor (top images) and ending at 1100 PST, coincident with the elevated measured concentration at the Westmorland monitor during the morning hours. Both trajectories illustrate the airflow from a southwest to west direction during the morning hours. By 1100 PST winds continued in a predominantly west direction except for El Centro and Calexico which had some northwest impact. The top images (0500 PST) include only Brawley and Westmorland while the bottom base map includes all stations (1100 PST). Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100 meters AGL; and green indicates airflow at 500 meters AGL. Dynamically generated through NOAA's Air Resources Laboratory

FIGURE 2-23
HYSPLIT BACK TRAJECTORY MODEL ENDING 1900 PST AND 2300 PST

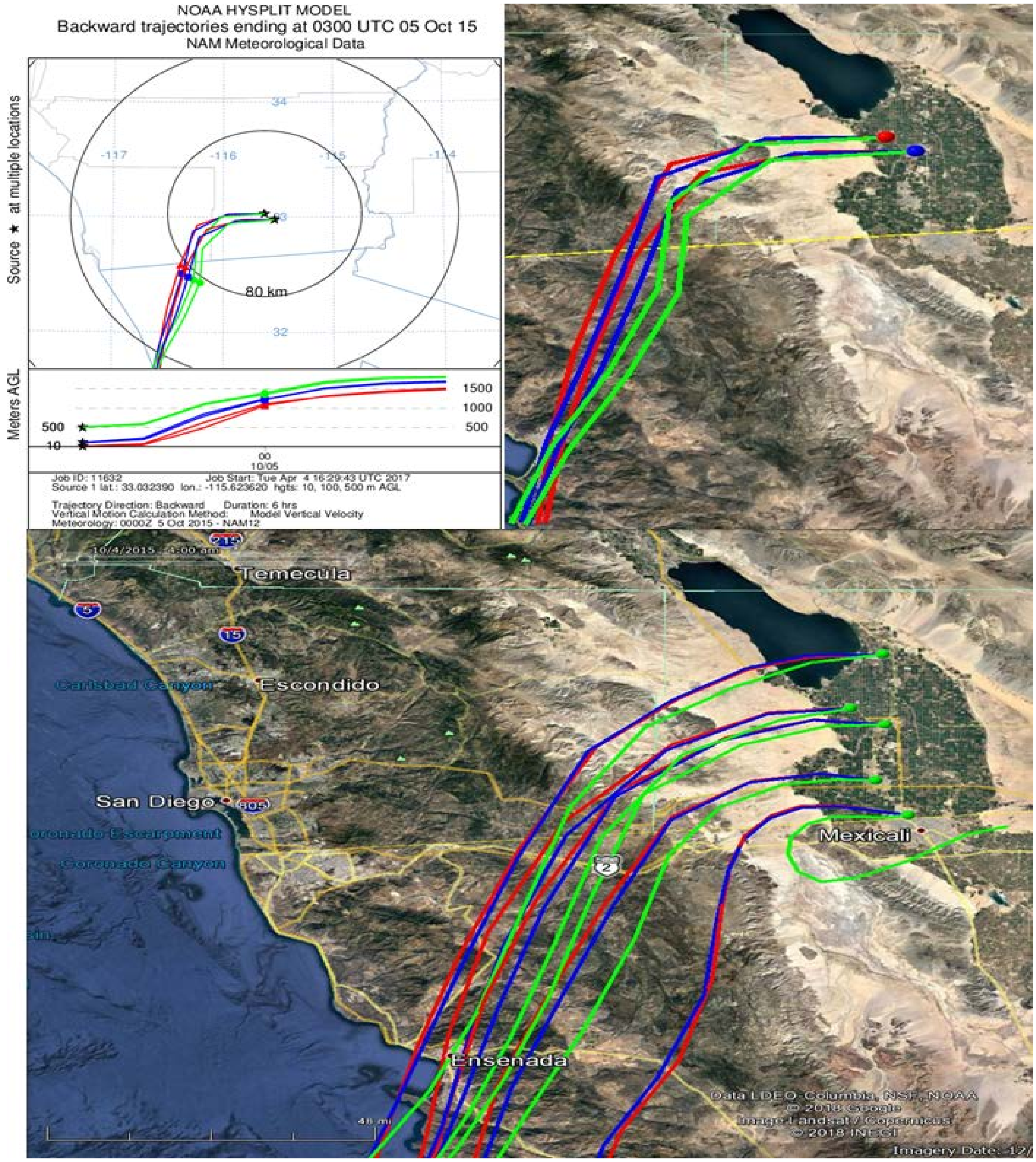


Fig 2-23: Two HYSPLIT back trajectories ending at 1900 PST, coincident with the afternoon peak concentration at the Westmorland and Brawley monitors (top images) and ending at 2300 PST. Both trajectories illustrate the airflow from a southwest to west direction during the morning hours. By 2300 PST winds continued in a predominantly west direction but with a slight southwest component. The top images (1900 PST) include only Brawley and Westmorland while the bottom base map includes all stations (2300 PST). Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100 meters AGL; and green indicates airflow at 500 meters AGL. Dynamically generated through NOAA's Air Resources Laboratory

Figures 2-24 and 2-25 illustrate the elevated levels of wind speeds and hourly PM_{10} concentrations measured in Riverside, Imperial and Yuma Counties.[6] As the weather system moved inland and eastward into northern Arizona, the winds preceding the system varied in timing but remained moderate throughout Imperial County and Riverside County. While both airports in Imperial County measured a decrease in wind speeds between 1000 am and noon, other stations located in Riverside and the mountain areas did not. The decrease in wind speeds in Imperial County was insufficient to allow transported windblown dust to settle. Thus, as winds regained strength in Imperial County, elevated emissions entrained by gusty west winds, associated with the passing of a strong and cold low pressure, blew into Imperial County affecting the Brawley and Westmorland monitors on October 4, 2015. The Brawley and Westmorland monitors measured elevated concentrations throughout the day. The Brawley monitor measured a total of 14 hours of elevated concentrations while the Westmorland monitor measured 16 hours of elevated concentrations, split between morning and evening measurements. This was coincident with measured wind speeds at 25 mph, and gusts above 25 mph.

The resulting entrained dust and accompanying high winds from the system qualify this event as a "high wind dust event".[7] High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the October 4, 2015 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

[6] National Weather Service; NOAA's Glossary – Wind Speed: The rate at which air is moving horizontally past a given point. It may be a 2-minute average speed (reported as wind speed) or an instantaneous speed (reported as a peak wind speed, wind gust, or squall) http://w1.weather.gov/glossary/index.php?letter=w

[7] Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

FIGURE 2-24
72 HOUR PM_{10} FLUCTUATIONS NEIGHBORING SITES

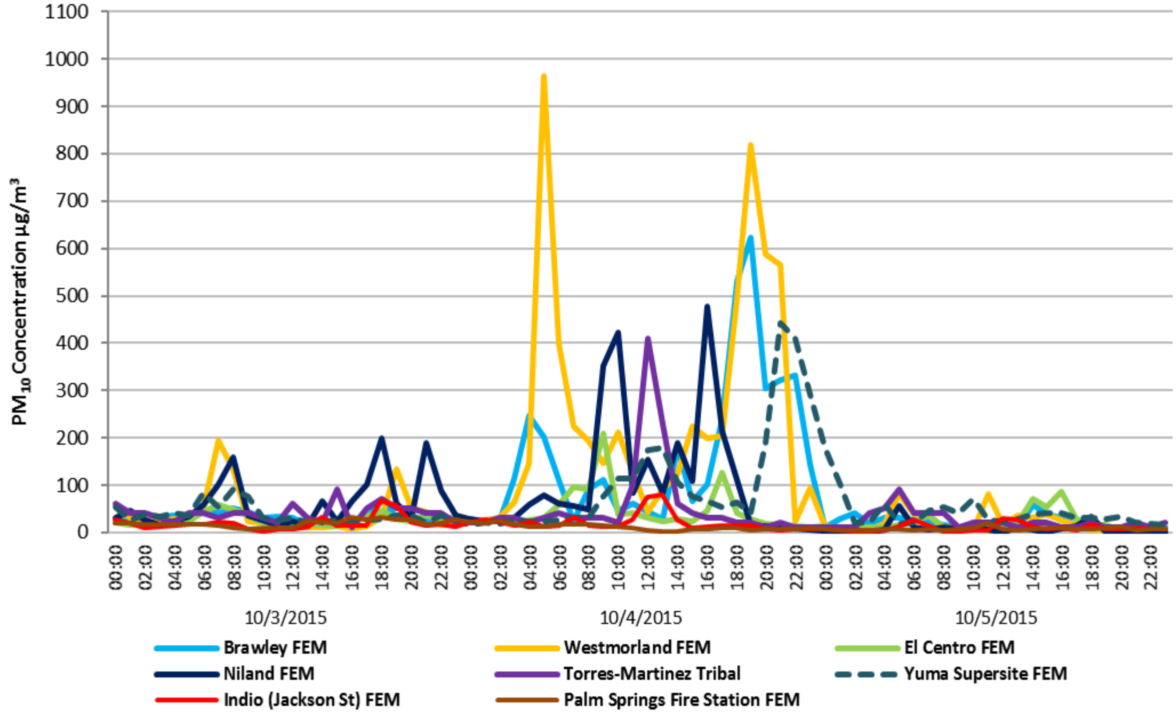


Fig 2-24: Is the graphical representation of the 72-hour relative PM_{10} concentrations at various monitoring locations throughout Riverside, Imperial, and Yuma counties. The graph demonstrates that PM_{10} concentrations at monitors located within the northern portion of the air monitoring network were affected by the passing of the weather system and accompanying winds on October 4, 2015. Air quality data from the EPA's AQS system

FIGURE 2-25
72 HOUR PM_{10} FLUCTUATIONS NEIGHBORING SITES

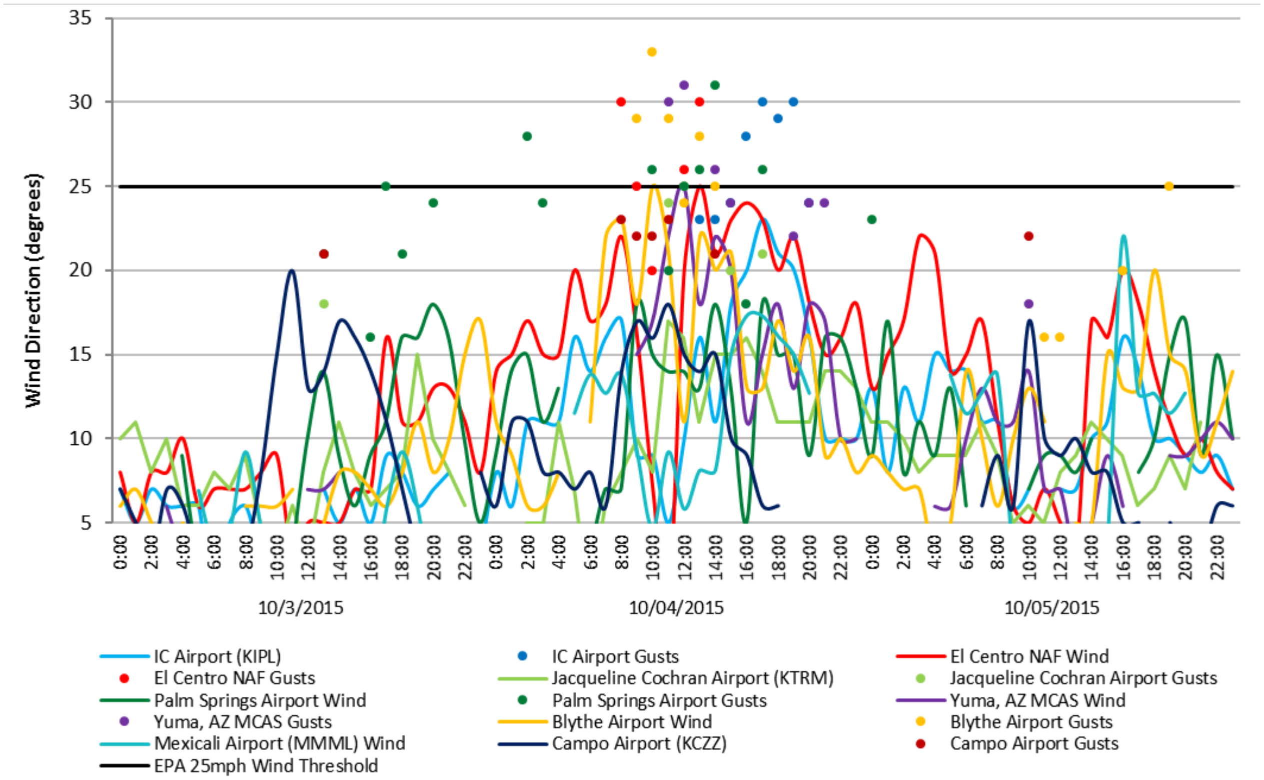


Fig 2-25: Is the graphical representation of the 72 hour measured wind speeds and gusts at various regional airports in California, Arizona and Mexico. The graph illustrates the consistent moderate level of elevated wind speeds at a regional level. Wind data from NCEI's QCLCD system

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM_{10} concentrations measured at the Brawley and Westmorland monitors on October 4, 2015, compared to non-event and event days demonstrates the variability over several years and seasons. The analysis also provides supporting evidence that there exists a clear causal relationship between the October 4, 2015 high wind event and the exceedance measured at the Brawley and Westmorland monitors.

Figures 3-1 through 3-3 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Brawley and Westmorland monitors for the period of January 1, 2010 through October 4, 2015. Note that prior to 2013, BAM data was not FEM therefore, not reported into AQS.[8] Properly establishing the variability of the event as it occurred on October 4, 2015, 24-hour averaged PM_{10} concentrations between January 1, 2010 and October 4, 2015 were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on October 4, 2015, were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs obtained through the EPA's AQS data bank.

[8] Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM_{10} concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m3) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM_{10} concentrations to PM_{10} concentrations with in this demonstration.

FIGURE 3-1
BRAWLEY HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO OCTOBER 4, 2015

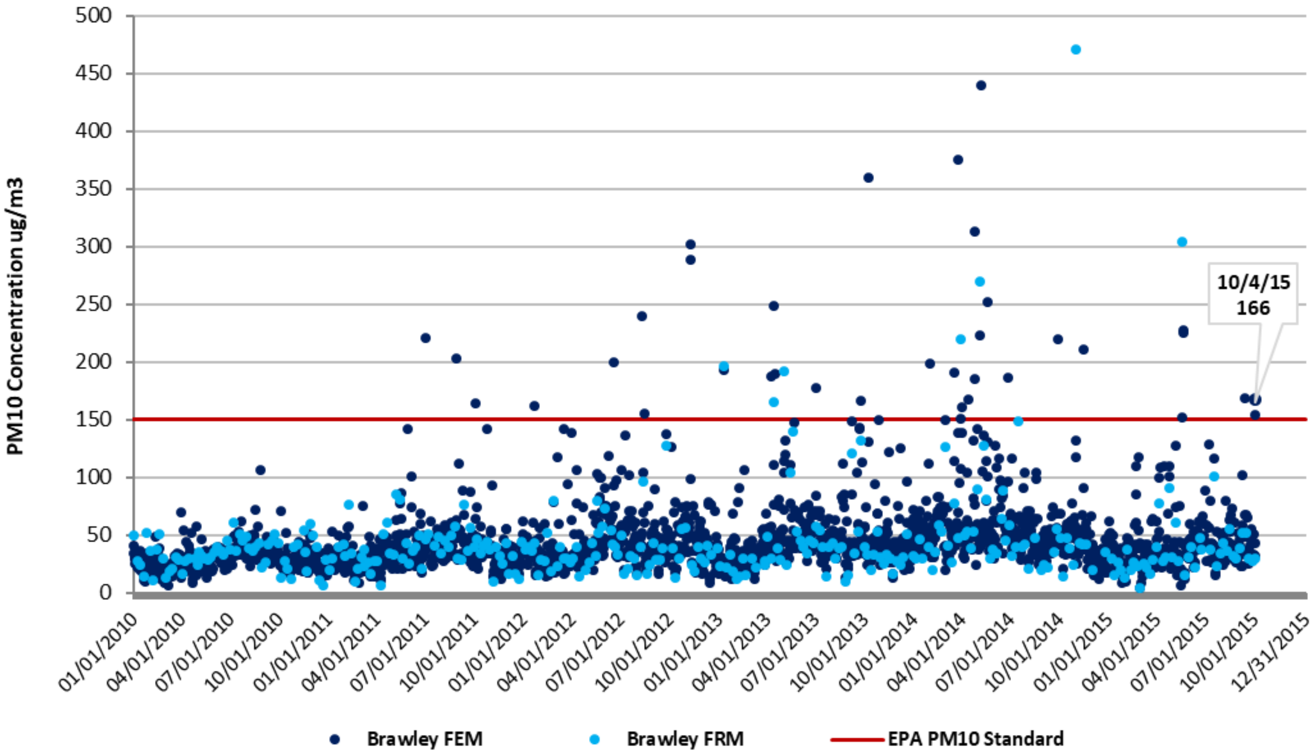


Fig 3-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 166 µg/m^3 on October 4, 2015 by the Brawley monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 2103 sampling days there were 36 exceedance days which is less than a 2.0% occurrence rate

FIGURE 3-2
WESTMORLAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO OCTOBER 4, 2015

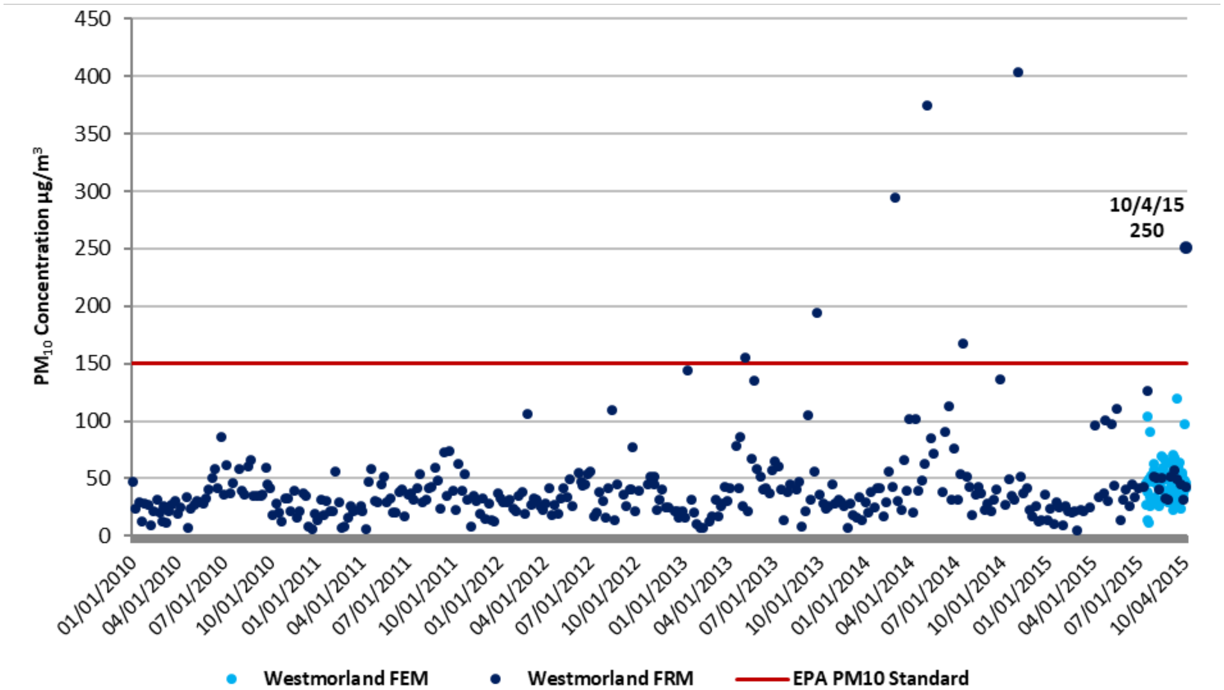


Fig 3-2: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 250 µg/m^3 on October 4, 2015 by the Westmorland monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 432 sampling days there were 7 exceedance days which is less than a 2.0% occurrence rate

FIGURE 3-3
BRAWLEY AND WESTMORLAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO OCTOBER 4, 2015

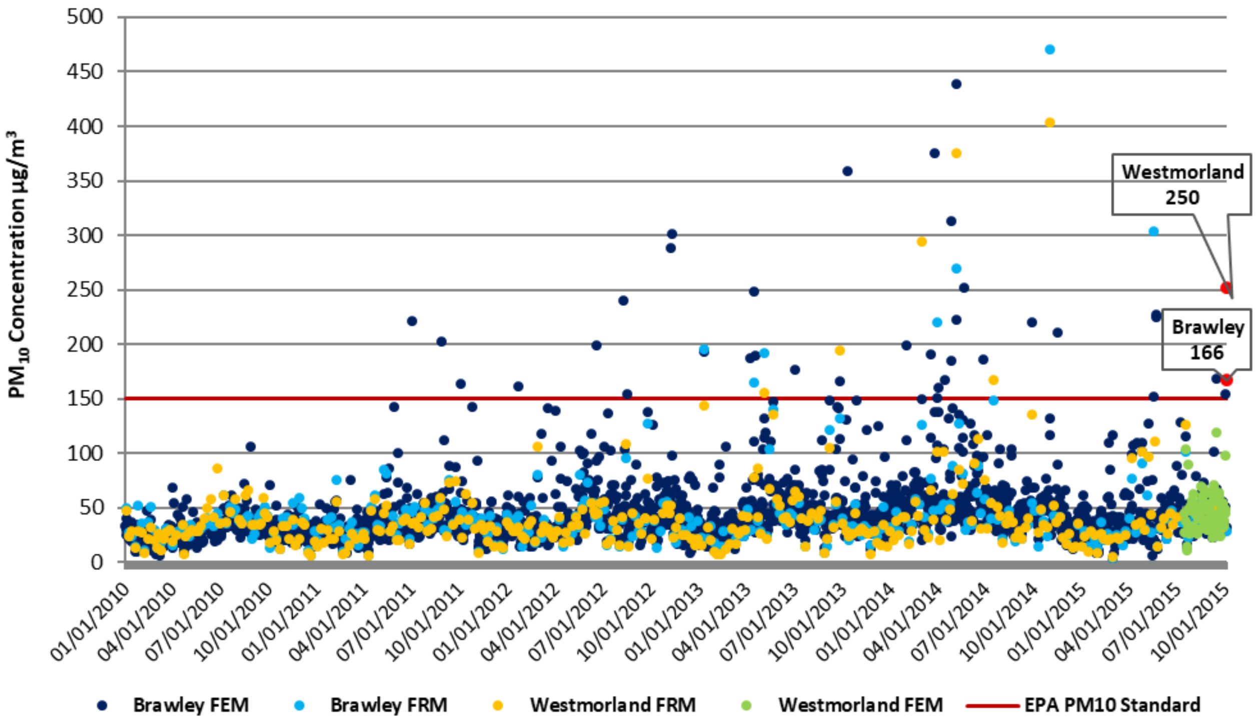
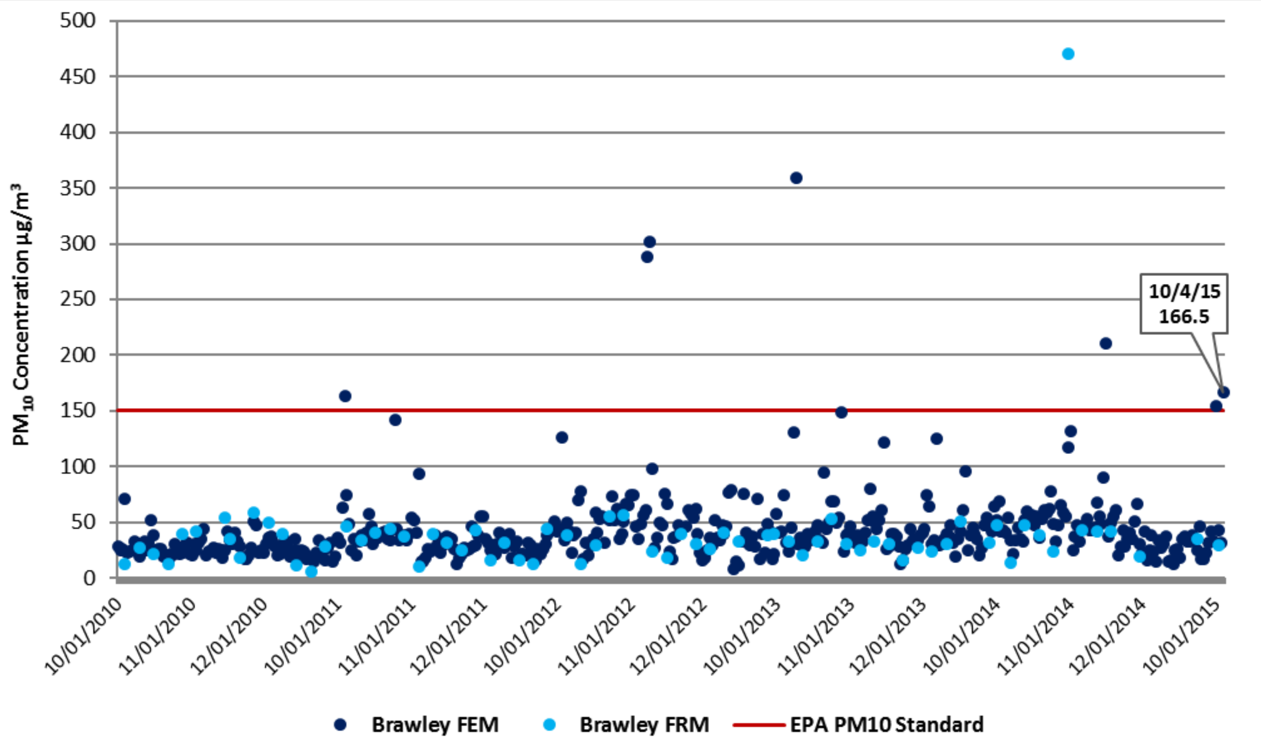


Fig 3-3: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 166 µg/m^3 and 250 µg/m^3 on October 4, 2015 by the Brawley and Westmorland monitors were outside the normal historical concentrations when compared to similar event days and non-event days.

The time series, **Figures 3-1 thru 3-3** for Brawley and Westmorland included 2,860 credible samples measured between January 1, 2010 and October 4, 2015 or a total 2,103 sampling days.

Overall, the time series illustrates that of the 2,103 sampling days between January 1, 2010 and October 4, 2015, there was a total of 38 exceedance days that occurred. Of the total 38 exceedance days only six days experienced individual FRM exceedances with no corresponding FEM exceedances. Two of the individual FRM exceedance days occurred during the first quarter, two occurred during the second quarter, one occurred during the third quarter, while the other individual FRM exceedance occurred during the fourth quarter. For FEM BAM and/or a combination of FRM/FEM measurements during the same time period there were 32 measured exceedance days. Of the 32 measured exceedance days only 10 were recorded during the fourth quarter (October through December). The other twenty two exceedance days occurred during the first, second, and third quarters during January 1, 2010 and October 4, 2015. No exceedances of the standard occurred during 2010. As mentioned above FEM BAM data was not considered regulatory from 2010 to 2012.

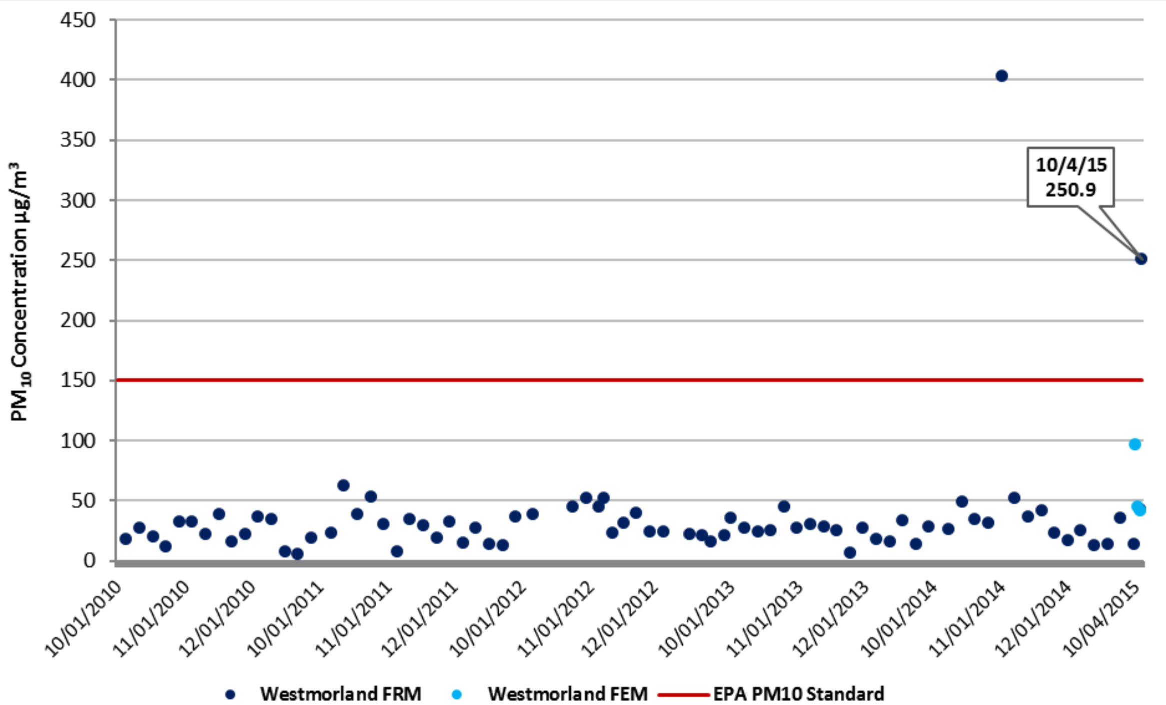
FIGURE 3-4
BRAWLEY SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH OCTOBER 4, 2015**



***Quarterly: October 1, 2015 through December 31, 2014 and October 1, 2015 through October 4, 2015**

Fig 3-4: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 166 µg/m^3 by the Brawley monitor on October 4, 2015 was outside the normal seasonal concentrations when compared to similar days and non-event days

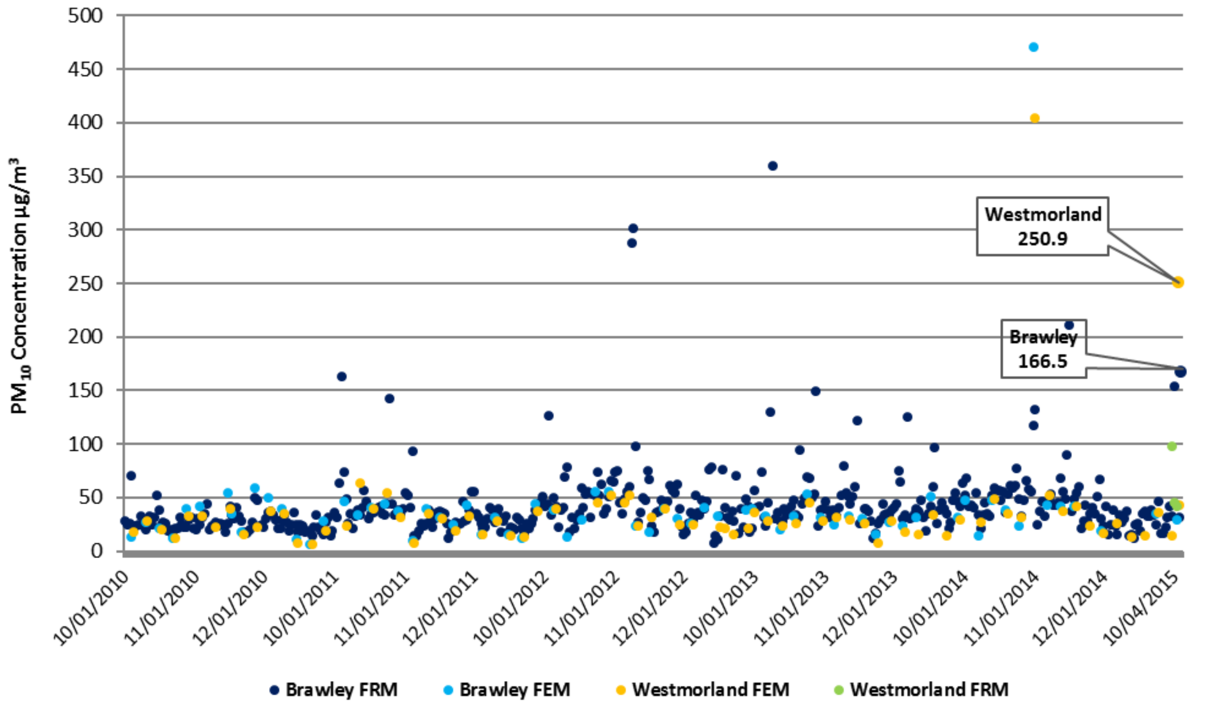
FIGURE 3-5
WESTMORLAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH OCTOBER 4, 2015**



***Quarterly: October 1, 2015 through December 31, 2014 and October 1, 2015 through October 4, 2015**

Fig 3-5: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 250 µg/m³ by the Westmorland monitor on October 4, 2015 was outside the normal seasonal concentrations when compared to similar days and non-event days

FIGURE 3-6
BRAWLEY AND WESTMORLAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH OCTOBER 4, 2015**



***Quarterly: October 1, 2015 through December 31, 2014 and October 1, 2015 through October 4, 2015**

Fig 3-6: A comparison of PM_{10} seasonal concentrations demonstrates that the measured concentration of 166 µg/m^3 and 250 µg/m^3 on October 4, 2015 by the Brawley and Westmorland monitors were outside the normal historical concentrations when compared to similar event days and non-event days

Figures 3-4 through 3-6 show the individual and combined seasonal concentrations (months October through December, years 2010 to 2015) for the Brawley and Westmorland stations. There are 636 combined FEM and FRM seasonal samples for Brawley and 182 combined FEM and FRM seasonal samples for Westmorland (Westmorland did not begin recording FEM samples until July 15, 2015). Of the 818 FRM and FEM credible samples measured for the two stations combined, only 11 exceedances occurred during the October to December time period between 2010 and 2015. Like the historical concentrations, the seasonal concentrations show that the exceedance measured on October 4, 2015 at each station falls outside the historical norm.

FIGURE 3-7
BRAWLEY AND WESTMORLAND HISTORICAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO OCTOBER 4, 2015

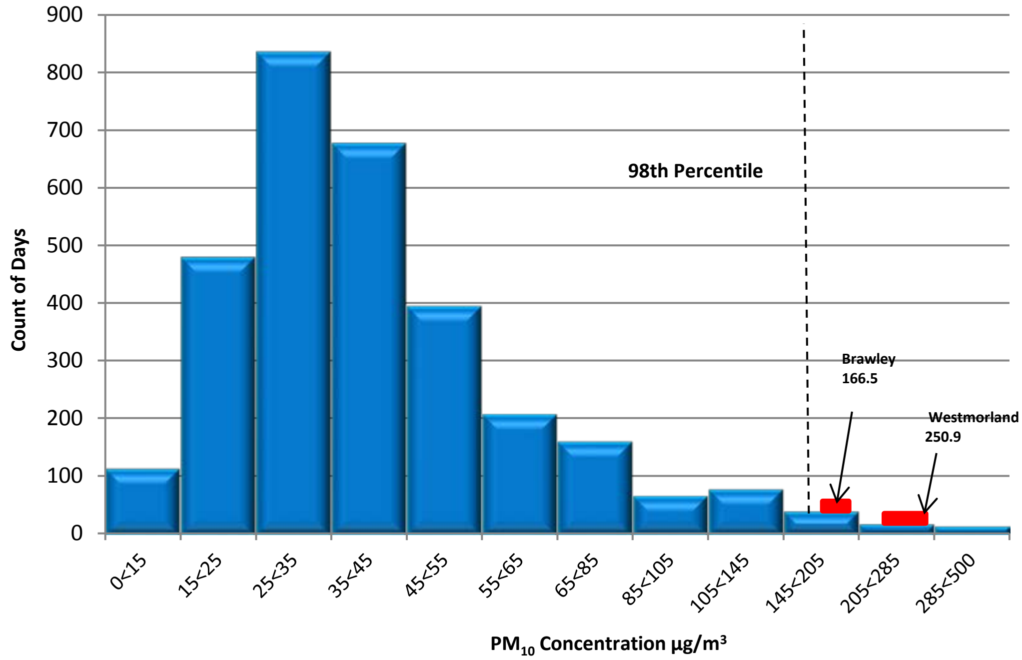
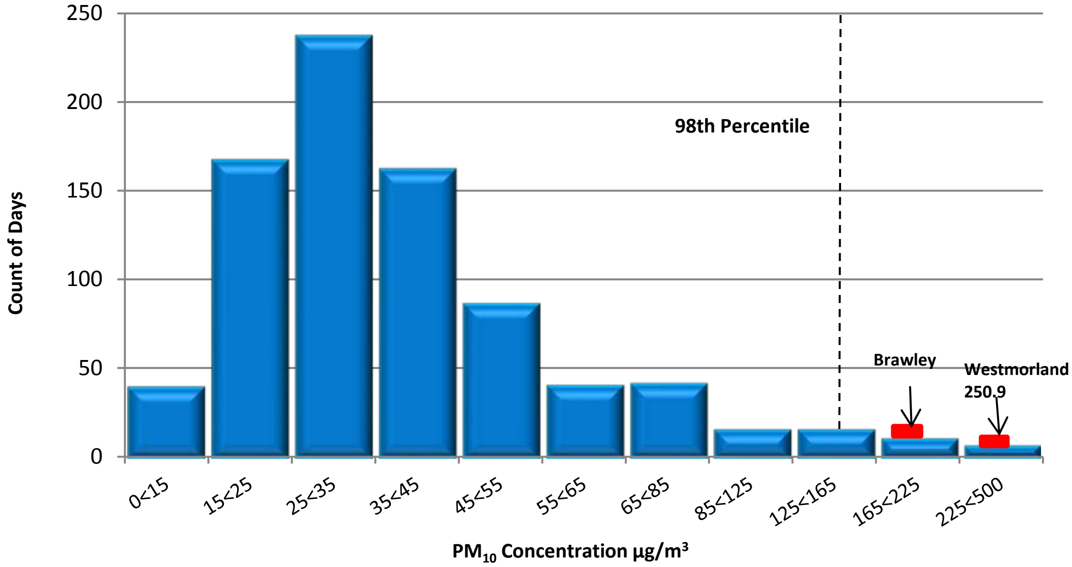


Fig 3-7: The 24-hr average PM_{10} concentrations measured at the Brawley and Westmorland monitoring sites demonstrates that the October 4, 2015 event was in excess of the 98th percentile.

FIGURE 3-8
BRAWLEY AND WESTMORLAND SEASONAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH OCTOBER 4, 2015**



***Quarterly: October 1, 2015 through December 31, 2014 and October 1, 2015 through October 4, 2015**

Fig 3-8: The 24-hr average PM_{10} concentrations at the Brawley and Westmorland monitoring sites demonstrate that the October 4, 2015 event was in excess of the 98^{th} percentile

Figures 3-7 through 3-8 represent percentile rankings for the two stations combined over a historical and seasonal period. For the combined FRM and FEM annual 2010 through 2015 Brawley and Westmorland dataset, the FEM concentrations of 166 µg/m^3 for Brawley and 250 µg/m^3 for Westmorland are above the 98^{th} percentile ranking.

Looking at the annual time series concentrations, the seasonal time series concentrations and the percentile ranking for both the historical and seasonal patterns the October 4, 2015 measured exceedance is clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM_{10} concentration observed on October 4, 2015 occurs infrequently. When comparing the measured PM_{10} levels on October 4, 2015 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedances measured at the Brawley and Westmorland monitoring sites were outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the October

4, 2015 natural event affected the concentrations levels at the Brawley and Westmorland monitors causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedances on October 4, 2015 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the "not reasonably controllable or preventable" (nRCP) criterion as two prongs. In order to properly address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures in order to properly consider the measures as enforceable. USEPA considers control measures enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that are identified as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is considered not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is considered not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for "high wind events" when PM_{10} concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a "natural event" where human activity plays little or no direct causal role and thus is considered not preventable.

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for October 4, 2015. In addition, this October 4, 2015 demonstration provides technical and non-technical evidence that strong gusty westerly winds blew across the mountains and deserts within southeastern California and into Imperial County suspending particulate matter affecting the Brawley and Westmorland monitors on October 4, 2015. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the October 4, 2015 EE.

IV.1 Background

Inhalable particulate matter (PM_{10}) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM_{10} NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM_{10} from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM_{10}. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006 ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

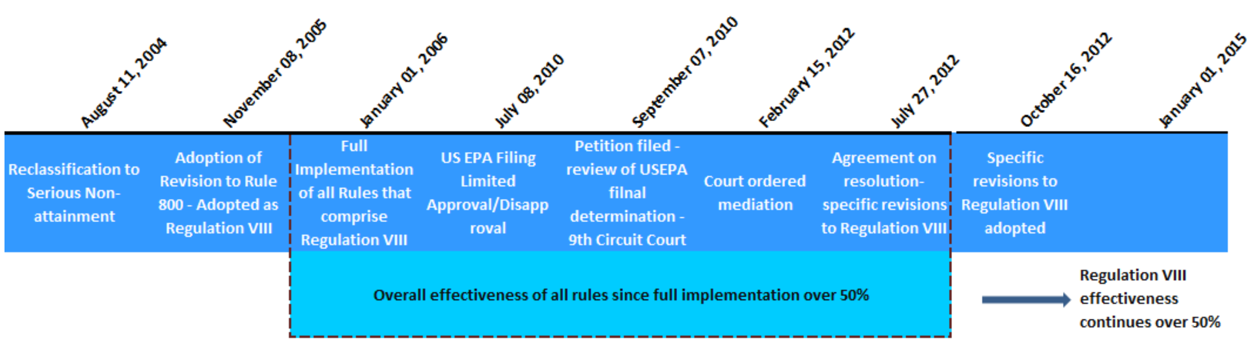


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

Below is a brief summary of Regulation VIII, which is comprised of seven fugitive dust rules.

Appendix D contains a complete set of the Regulation VIII rules.
ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10} from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B within Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generates dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM_{10} events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four-quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is the Good Neighbor Policy. On October 4, 2015 the ICAPCD declared a No Burn day **(Appendix A).** There were no complaints filed for agricultural burning on October 4, 2015.

IV.1.c Review of Source Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Westmorland, Niland and Brawley during the January 31, 2016 PM_{10} exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions. There were no complaints filed on October 4, 2015, officially declared as No Burn days, related to agricultural burning, waste burning or dust.

FIGURE 4-2
PERMITTED SOURCES

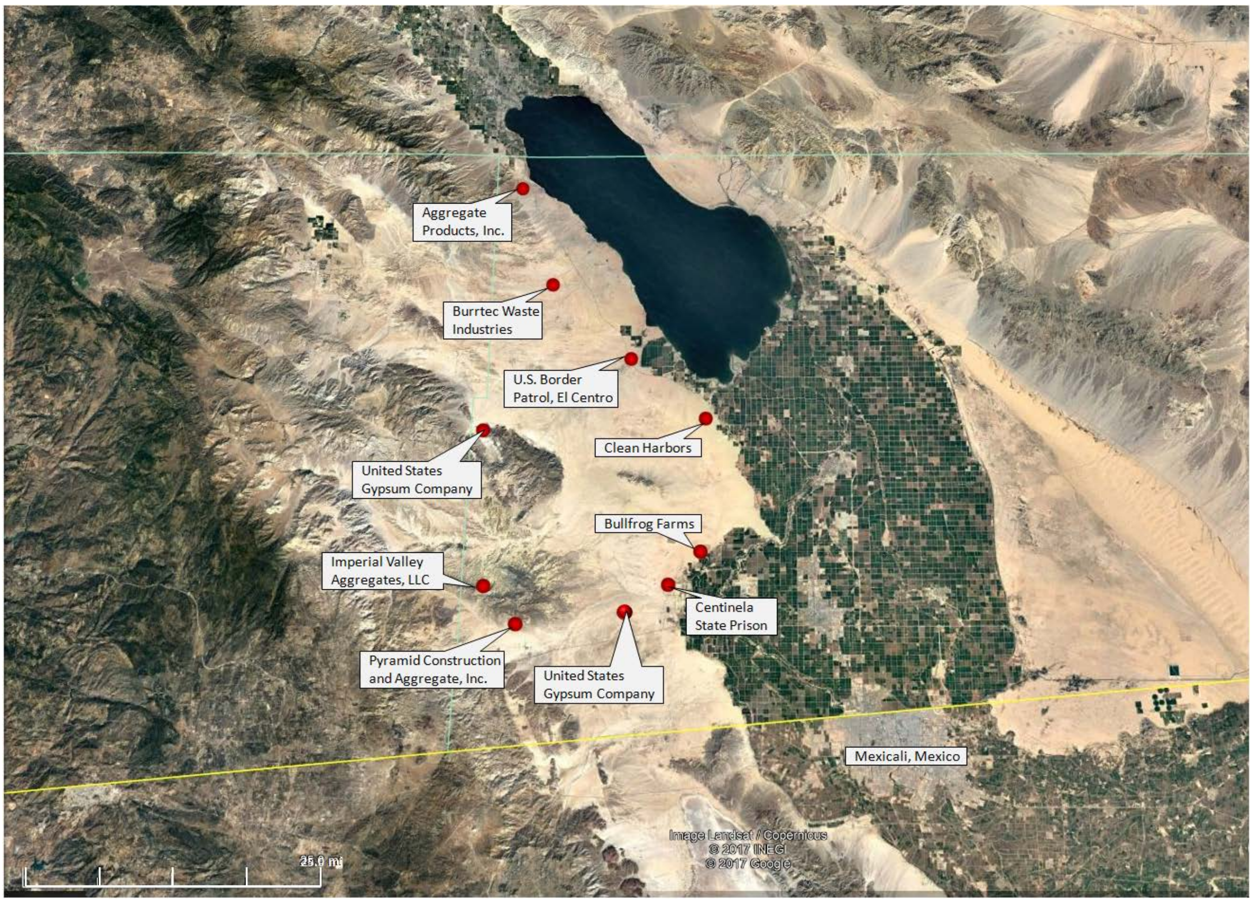


Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Brawley and Westmorland monitors. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, either the Bureau of Land Management or the California Department of Parks manages the desert areas. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

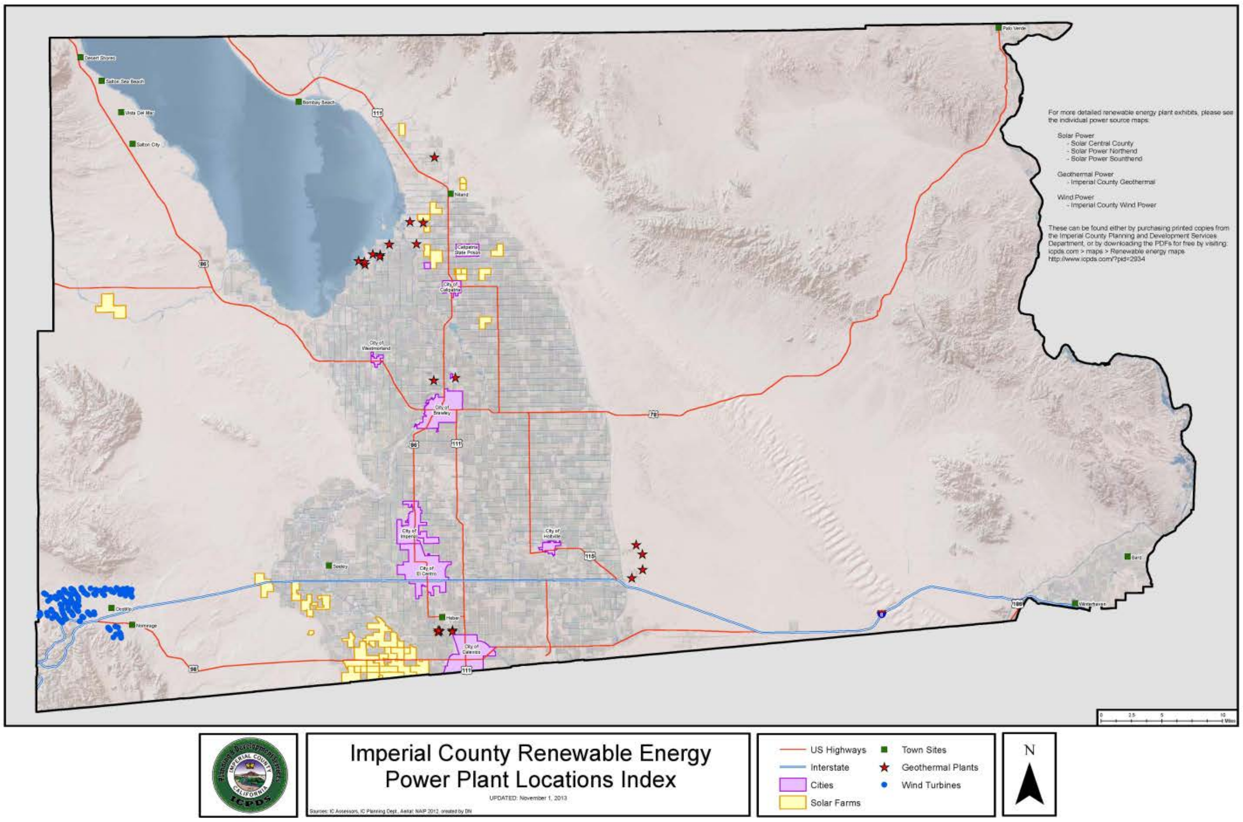


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Brawley and Westmorland monitors. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

IV.2 Forecasts and Warnings

As mentioned above, the San Diego office described a low-pressure system from the north moving into Southern California. The system was expected to bring numerous showers that would decrease by Monday. The San Diego NWS office forecasted gusty southwest to west winds 23 to 34 mph along desert slopes and into adjacent desert areas. The Phoenix office described a strong and relatively cold Canadian low-pressure system deepening south toward Central California resulting in afternoon gusty south winds for the service areas. **Appendix A** contains copies of pertinent notices to the October 4, 2015, exceptional event.

IV.3 Wind Observations

Wind data during the event were available from airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma (Arizona) County, northern Mexico, and Imperial County. The El Centro NAF measured one hour of 25 mph wind as well as measuring gusts up to 30 mph (see **Table 2-2)**. Winds along the desert slopes at Mountain Springs Grade were higher. Wind speeds of over 25 mph are normally sufficient to overcome most PM_{10} control measures. During the October 4, 2015 event, wind speeds reached the 25 mph threshold overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that high winds accompanying a strong and cold low-pressure system moved south from Canada down into Southern California. The winds preceding the system transported particulate matter that caused uncontrollable PM_{10} emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM_{10}, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements west of the Brawley and Westmorland monitoring stations during the event were high enough (at or above 25 mph, with wind gusts of 30 mph) that BACM PM_{10} control measures would have been overwhelmed.

Finally, a high wind dust event can be considered as a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on October 4, 2015 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedances and the high wind event timeline and geographic location. The October 4, 2015 event can be considered an exceptional event under the requirements of the exceptional event rule.

V Clear Causal Relationship

V.1 Discussion

Meteorological observations for October 4, 2015, identified the second of two low-pressure systems that moved down into Southern California. The second cold and stronger low-pressure system (upper low) from Western Canada moved down into Southern California then inland towards northern Arizona. This slow moving, well-defined upper low brought cooling and scattered rain Sunday, October 4, 2015 along mountain areas and higher deserts. Lower deserts remained dry. As the low moved inland towards the east and the trough passed slowly across Southern California preceding dry gusty west winds remained at a moderate level. The moderate level gusty winds were sufficient to blow through the San Diego Mountains and desert slopes transporting windblown dust into Imperial County affecting air quality and causing an exceedance at the Brawley and Westmorland monitors.

As discussed above, both airports measured elevated wind speeds with the El Centro Naval Air Facility (NAF)(KNJK) measuring consistently higher than the Imperial County Airport (KIPL). The El Centro NAF measured 23 hours of elevated winds speeds 14 to 25 mph while the Imperial County airport measured 19 hours of elevated wind speeds 10 to 23 mph. Both airports measured wind gusts 22 mph to 30 mph. Other sites, such as the Mountain Springs Grade site, measured 24 hours of elevated wind speeds 10 mph to 31 mph and gusts 26 mph to 46 mph. In addition, measured gusts at several sites within the mountain and desert slopes of San Diego measured at or above 25 mph.

Entrained windblown dust from natural areas, particularly from the desert area and anthropogenic sources controlled with BACM, is verified by the meteorological and air quality observations on October 4, 2015. Meteorological data show that these gusty westerly winds blew across the San Diego mountain slopes and natural open deserts were directly responsible for the high PM_{10} concentrations observed in Imperial County on October 4, 2015.

Figures 5-1 through 5-4 provide information regarding the tightening of the surface gradient, the amount of particles existing in the ambient air and the movement of the winds on October 4, 2015.

FIGURE 5-1
SURFACE GRADIENT TIGHTENS MORNING OF OCTOBER 4, 2015

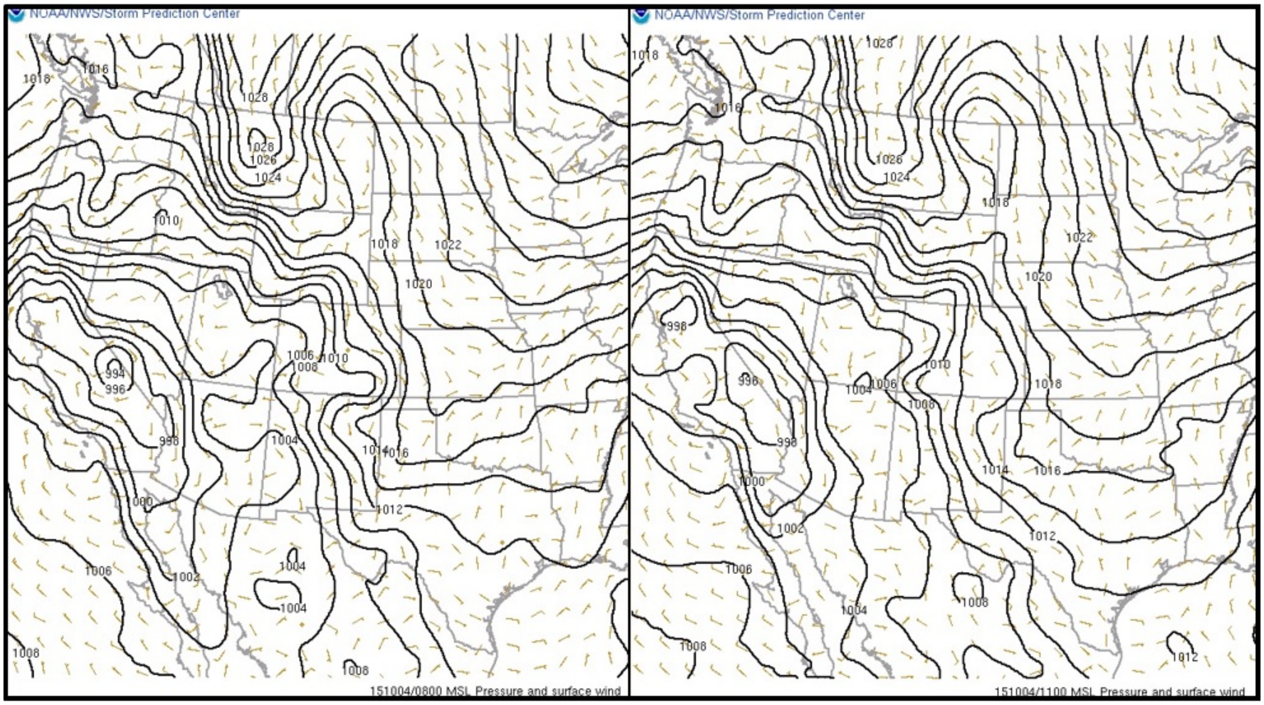


Fig 5-1: A strong and cold low pressure moved through the region and tightened the surface gradient, causing gusty westerly winds across southern California. The left image is at 2200 PST October 3, 2015 and the right image is at 0300 PST on October 4, 2015. Unfortunately, data for the rest of the day is absent. Source: NOAA's NWS Storm Prediction Center; http://www.spc.noaa.gov/exper/archive/event.php

FIGURE 5-2
SURFACE GRADIENT REMAINS PACKED AFTERNOON OF OCTOBER 4. 2015

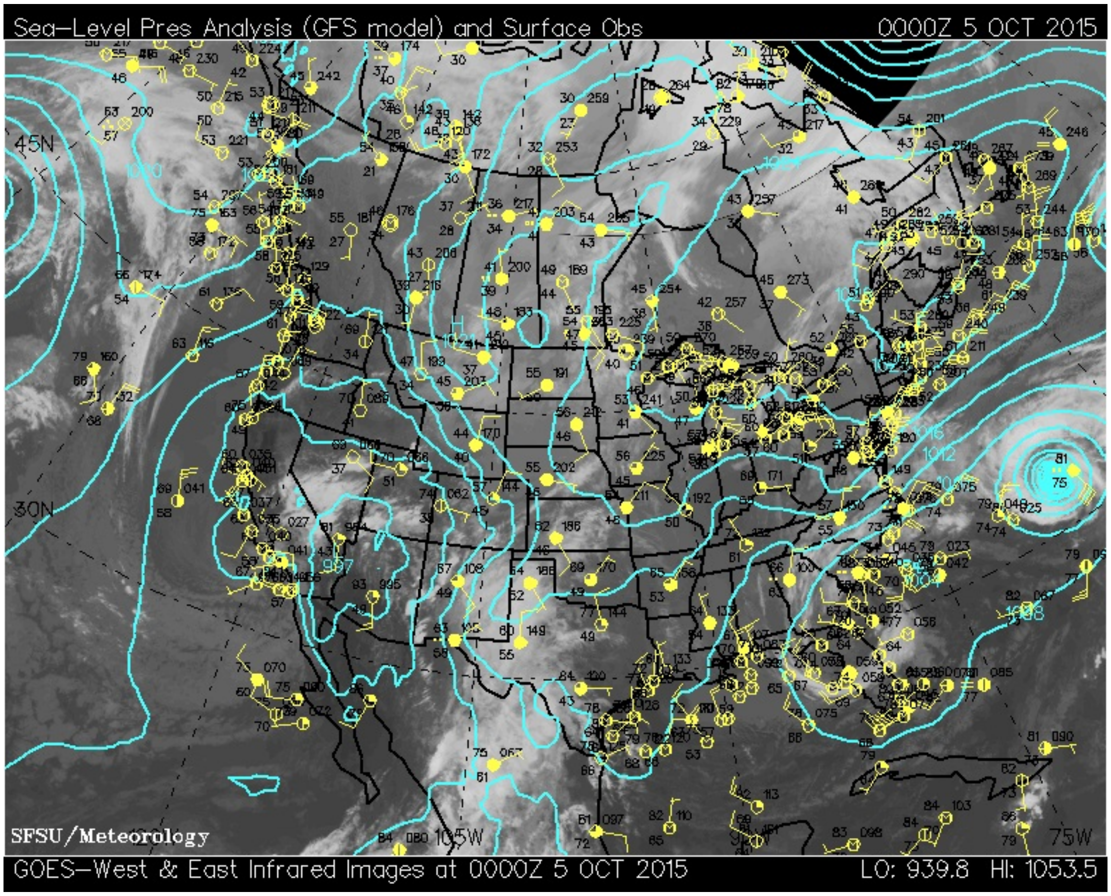


Fig 5-2: The surface gradient remained modestly packed during the afternoon of October 4, 2015. This image is at 1600 PST. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server; http://virga.sfsu.edu/archive/composites/sathts_snd/1510

Figure 5-3 shows the aerosols drifting over Imperial County. This image uses the Deep Blue Angstrom Exponent layer to differentiate larger sized aerosols that are more likely dust.[9] Green colors indicate larger sized aerosols. The color depicted in the image shows a patch of aerosols that fall just under "1.0" indicating a likely hood of dust-sized particles (see scale on left of image). Unfortunately, both the Terra and Aqua satellites carrying the MODIS instrument[10] made their pass before PM_{10} concentrations were at their highest. Additionally, heavy cloud cover hindered further analysis of potential windblown dust.

[9] The MODIS **Deep Blue Aerosol Ångström Exponent** layer can be used to provide additional information related to the aerosol particle size over land. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths). The Ångström exponent provides additional information on the particle size (larger the exponent, the smaller the particle size). Values < 1 suggest optical dominance of coarse particles (e.g. dust) and values > 1 suggest optical dominance of fine particles (e.g. smoke).

[10] MODIS (or Moderate Resolution Imaging Spectroradiometer) is a key instrument aboard the Terra (originally known as EOS AM-1) and Aqua (originally known as EOS PM-1) satellites. Terra's orbit around the Earth is timed so that it passes from north to

FIGURE 5-3
AEROSOLS OVER IMPERIAL COUNTY

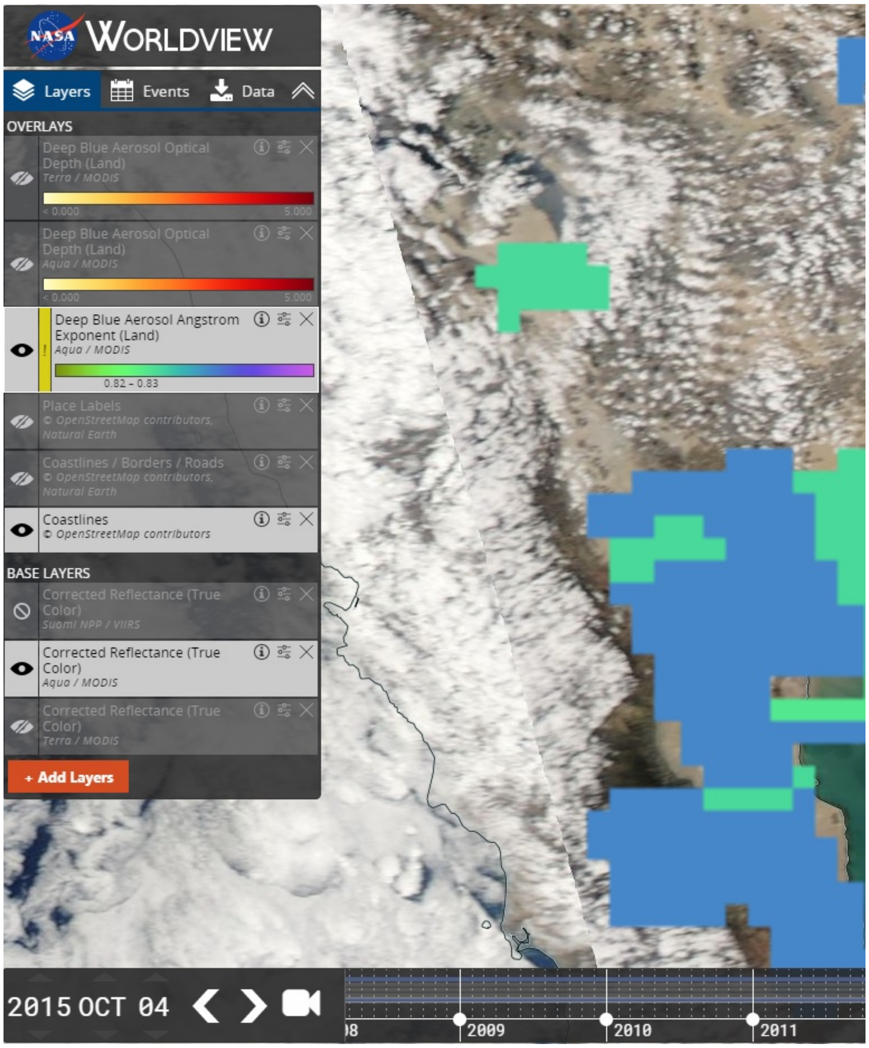


Fig 5-3: The image identifies a patch of moderately large-sized aerosols drifting over Imperial County on October 4, 2015 at ~1330. Unfortunately, heavy cloud cover interfered with the detection of aerosols. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

Figure 5-4 is a NEXRAD base velocity image captured at 1825 PST coincident with gusty west winds and elevated concentrations of PM_{10}. The image provides some affirmation of the observation made by the NWS office in Phoenix that dry air from the west was flowing across Central and Northern Baja. Brighter colors of green indicate motion of greater velocity approaching the radar site, while degrees of red colors indicate movement away from the radar. Although NEXRAD data is available for only the extreme southeastern portion of Imperial County,

south across the equator in the morning, while Aqua passes south to north over the equator in the afternoon. MODIS Technical Specifications identify the Terra orbit at 1030am and the Aqua at 130pm.

the image does provide a general idea of the velocity of winds.

FIGURE 5-4
NEXRAD BASE VELOCITY OCTOBER 4, 2015

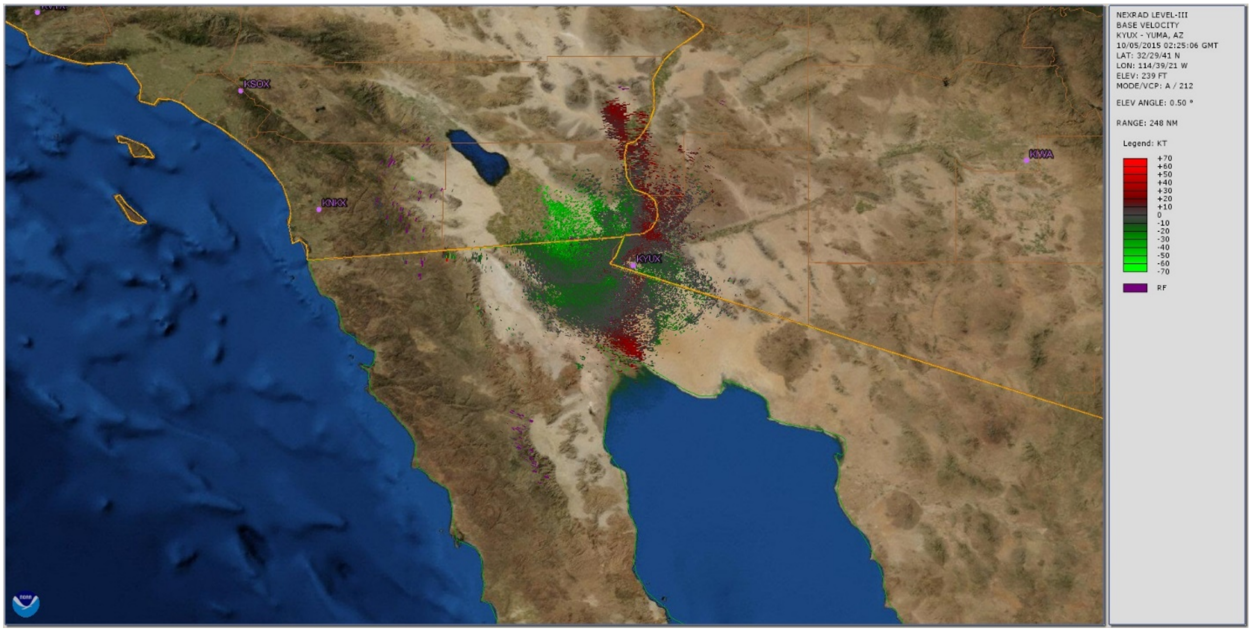


Fig 5-4: A NEXRAD base velocity image captured by the Yuma, Arizona station at 1825 PST on October 4, 2015. Green colors indicate movement toward the radar station, red indicates motion away from the station. The bright green colors give an indication of the wind speeds as the system moved eastward. NEXRAD data is only available for the extreme southeastern portion of Imperial County. Dynamically generated through NOAA Weather and Climate Toolkit

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.[11] **Tables 5-1 through 5-3** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM_{10} concentrations at the exceeding stations. The Brawley and Westmorland monitors show peak hourly concentrations following or during the period of high upstream wind speeds. The Brawley station does not have its own meteorological instruments, as does Westmorland, thus the Mountain Springs Grade station located southwest of Brawley is included in the table. The Mountain Springs Grade measured gusty west winds blowing across and through the mountain passes of San Diego County, down the canyon/desert slopes along Interstate 8 and onto the open natural desert areas of Imperial County. The gusty west winds transported windblown dust toward Brawley and Westmorland, elevating concentrations sufficiently to cause an exceedance.

[11] "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

TABLE 5-1
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR BRAWLEY OCTOBER 4, 2015

	El Centro NAF (KNJK)			Imperial County Airport (KIPL)			Mountain Springs Grade (TNSC1)			Sunrise-Ocotillo (IMPSD)			Fish Creek Mountains (FHCC1)			Brawley
HOUR	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	PM_{10} (µg/m³)
0	14		260	8		270	25	40	206	24	36	224	15	23	182	29
100	15		260	6		270	26	39	205	25	36	226	15	21	197	24
200	17		260	11		280	29	43	218	10	22	330	19	26	205	24
300	15		260	11		270	31	44	216	9	20	328	19	29	194	114
400	15		270	11		280	30	43	220	14	26	249	17	25	201	247
500	20		260	16		280	29	46	221	19	35	240	15	26	200	201
600	17		250	14		280	25	43	208	19	30	242	14	24	205	110
700	18		250	16		260	22	40	219	22	31	227	16	27	223	24
800	22	30	230	17		250	13	33	213	12	19	239	15	29	193	92
900	16	25	220	9		200	10	30	228	10	18	229	18	34	209	112
1000	7	20	160	9		190	13	28	233	11	19	260	18	32	205	45
1100				5		VR	15	26	227	10	20	262	17	42	210	60
1200	20	26	260	10		280	16	31	218	10	17	249	16	34	195	44
1300	25	30	270	16	23	280	14	27	233	14	22	236	19	29	203	28
1400	21		270	11	23	310	14	29	222	11	20	250	16	31	202	179
1500	23		270	18	24	280	15	29	230	10	17	261	13	40	205	67
1600	24		260	20	28	270	12	26	223	14	24	255	12	31	219	102
1700	23		270	23	30	280	24	32	217	15	26	253	11	33	204	240
1800	20		280	21	29	280	17	31	233	16	26	244	5	30	195	530
1900	22		280	20	30	270	22	34	218	16	22	237	9	26	226	624
2000	18		280	16	24	290	26	38	215	17	30	241	4	17	234	304
2100	15		290	10		320	25	39	215	20	33	237	7	26	201	321
2200	16		290	10		310	25	36	216	22	36	232	8	21	199	332
2300	18		280	10		320	20	31	210	19	34	223	11	21	197	144

Due to the different times that air quality and wind data is sampled at different sites, the hour reflects the hour in which the measurement was taken, and not necessarily the actual time. Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for the Fish Creek Mountains (FHCC1), Sunrise-Ocotillo (IMPSD), and Mountain Springs Grade (TNSC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. VR= Variable Brawley station does not record wind data

TABLE 5-2
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR WESTMORLAND OCTOBER 4, 2015

	El Centro NAF (KNJK)			Imperial County Airport (KIPL)			Mountain Springs Grade (TNSC1)			Sunrise-Ocotillo (IMPSD)			Fish Creek Mountains (FHCC1)			Westmorland
HOUR	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	PM_{10} (µg/m³)
0	14		260	8		270	25	40	206	24	36	224	15	23	182	21
100	15		260	6		270	26	39	205	25	36	226	15	21	197	27
200	17		260	11		280	29	43	218	10	22	330	19	26	205	32
300	15		260	11		270	31	44	216	9	20	328	19	29	194	63
400	15		270	11		280	30	43	220	14	26	249	17	25	201	146
500	20		260	16		280	29	46	221	19	35	240	15	26	200	963
600	17		250	14		280	25	43	208	19	30	242	14	24	205	399
700	18		250	16		260	22	40	219	22	31	227	16	27	223	225
800	22	30	230	17		250	13	33	213	12	19	239	15	29	193	195
900	16	25	220	9		200	10	30	228	10	18	229	18	34	209	147
1000	7	20	160	9		190	13	28	233	11	19	260	18	32	205	212
1100				5		VR	15	26	227	10	20	262	17	42	210	126
1200	20	26	260	10		280	16	31	218	10	17	249	16	34	195	43
1300	25	30	270	16	23	280	14	27	233	14	22	236	19	29	203	90
1400	21		270	11	23	310	14	29	222	11	20	250	16	31	202	124
1500	23		270	18	24	280	15	29	230	10	17	261	13	40	205	224
1600	24		260	20	28	270	12	26	223	14	24	255	12	31	219	198
1700	23		270	23	30	280	24	32	217	15	26	253	11	33	204	204
1800	20		280	21	29	280	17	31	233	16	26	244	5	30	195	495
1900	22		280	20	30	270	22	34	218	16	22	237	9	26	226	819
2000	18		280	16	24	290	26	38	215	17	30	241	4	17	234	587
2100	15		290	10		320	25	39	215	20	33	237	7	26	201	565
2200	16		290	10		310	25	36	216	22	36	232	8	21	199	23
2300	18		280	10		320	20	31	210	19	34	223	11	21	197	93

Due to the different times that air quality and wind data is sampled at different sites, the hour reflects the hour in which the measurement was taken, and not necessarily the actual time. Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for the Fish Creek Mountains (FHCC1), Sunrise-Ocotillo (IMPSD), and Mountain Springs Grade (TNSC1) from the University of Utah's MesoWest system. VR= Variable Wind speeds = mph; Direction = degrees

TABLE 5-3
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR WESTMORLAND OCTOBER 4, 2015

	El Centro NAF (KNJK)			Imperial County Airport (KIPL)			Mountain Springs Grade (TNSC1)			Fish Creek Mountains (FHCC1)			Westmorland		Westmorland
HOUR	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/G	W/D	W/S	W/D	PM_{10} (µg/m³)
0	14		260	8		270	25	40	206	15	23	182	3.4	124	21
100	15		260	6		270	26	39	205	15	21	197	2	134	27
200	17		260	11		280	29	43	218	19	26	205	3.5	264	32
300	15		260	11		270	31	44	216	19	29	194	7.2	276	63
400	15		270	11		280	30	43	220	17	25	201	8	270	146
500	20		260	16		280	29	46	221	15	26	200	5.3	260	963
600	17		250	14		280	25	43	208	14	24	205	5.9	255	399
700	18		250	16		260	22	40	219	16	27	223	7	259	225
800	22	30	230	17		250	13	33	213	15	29	193	6.5	258	195
900	16	25	220	9		200	10	30	228	18	34	209	7.3	249	147
1000	7	20	160	9		190	13	28	233	18	32	205	8.3	229	212
1100				5		VR	15	26	227	17	42	210	8.2	201	126
1200	20	26	260	10		280	16	31	218	16	34	195	6.6	237	43
1300	25	30	270	16	23	280	14	27	233	19	29	203	7.6	257	90
1400	21		270	11	23	310	14	29	222	16	31	202	6.9	252	124
1500	23		270	18	24	280	15	29	230	13	40	205	7.5	259	224
1600	24		260	20	28	270	12	26	223	12	31	219	7.9	266	198
1700	23		270	23	30	280	24	32	217	11	33	204	8.7	264	204
1800	20		280	21	29	280	17	31	233	5	30	195	9.8	267	495
1900	22		280	20	30	270	22	34	218	9	26	226	11.2	273	819
2000	18		280	16	24	290	26	38	215	4	17	234	7.4	289	587
2100	15		290	10		320	25	39	215	7	26	201	6.7	293	565
2200	16		290	10		310	25	36	216	8	21	199	6	295	23
2300	18		280	10		320	20	31	210	11	21	197	5.8	302	93

Due to the different times that air quality and wind data is sampled at different sites, the hour reflects the hour in which the measurement was taken, and not necessarily the actual time. Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for the Fish Creek Mountains (FHCC1) and Mountain Springs Grade (TNSC1) from the University of Utah's MesoWest system. VR= Variable Wind speeds = mph; Direction = degrees. Westmorland does not measure wind gusts

As discussed above, area forecast discussions written as early as September 30, 2015 by the San Diego and Phoenix offices described a well-defined upper low dropping southward into Southern California. The preceding gusty west winds transported windblown dust from the San Diego mountains and desert slopes affecting air quality in Imperial County and causing an exceedance at the Brawley and Westmorland monitors. Elevated wind speeds are coincident with elevated concentrations at the Brawley and Westmorland monitors. October 4, 2015 was not a scheduled run day and the Calexico station did not operate a continuous PM_{10} monitor. As noted in section II above, the El Centro monitor had a more northern influence allowing for winds to blow through a more urbanized and developed parcel of land (**Figure 5-5**). This allowed winds to decrease, and allowed for less saltation and deposition of particulate matter onto the El Centro monitor. The

Niland monitor measured elevated concentrations sporadically throughout the day however with less saltation and deposition of particles as winds blew over the Salton Sea no exceedance occurred (**Figure 5-5**).

FIGURE 5-5
ALL SITES ENDING 1100 PST AND 2300 PST ON OCTOBER 4, 2015

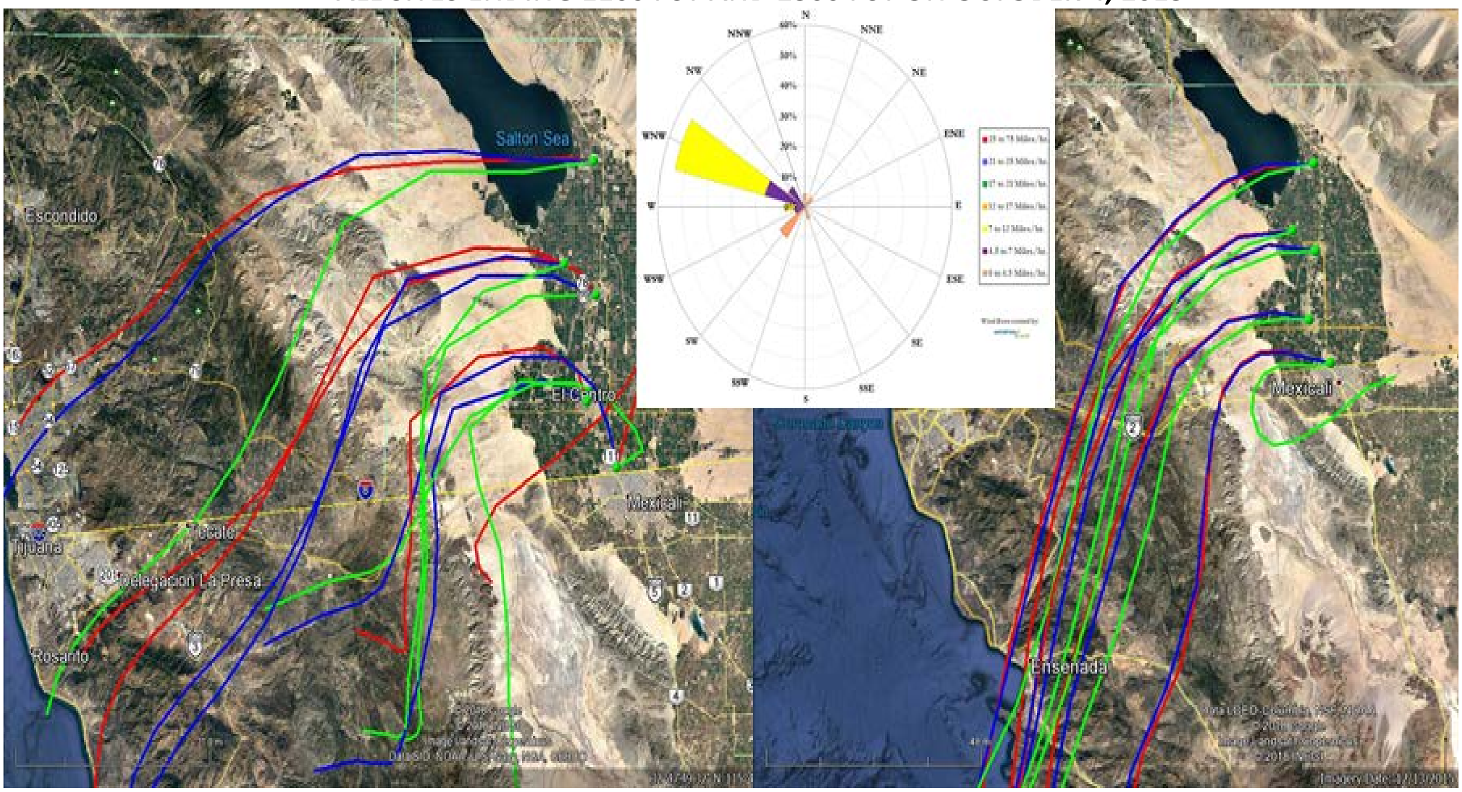


Fig 5-5: Two 12-hour back trajectories ending at 1100 PST and 2300 PST for all monitors in Imperial County. The inset is the El Centro wind rose found in section **Figure 2-22**. The red trajectory indicates airflow at 10 meters AGL (above ground level); blue is 100m; and green is 500m. Dynamically generated through NOAA's Air Resources Laboratory. Google Earth base map

Figures 5-6 and 5-7 are graphical representations of the meteorological conditions existing October 4, 2015 as transported windblown dust entered Imperial County on October 4, 2015.

FIGURE 5-6
EXCEEDANCE TIMELINE ENDING AT 0500 ON OCTOBER 4, 2015

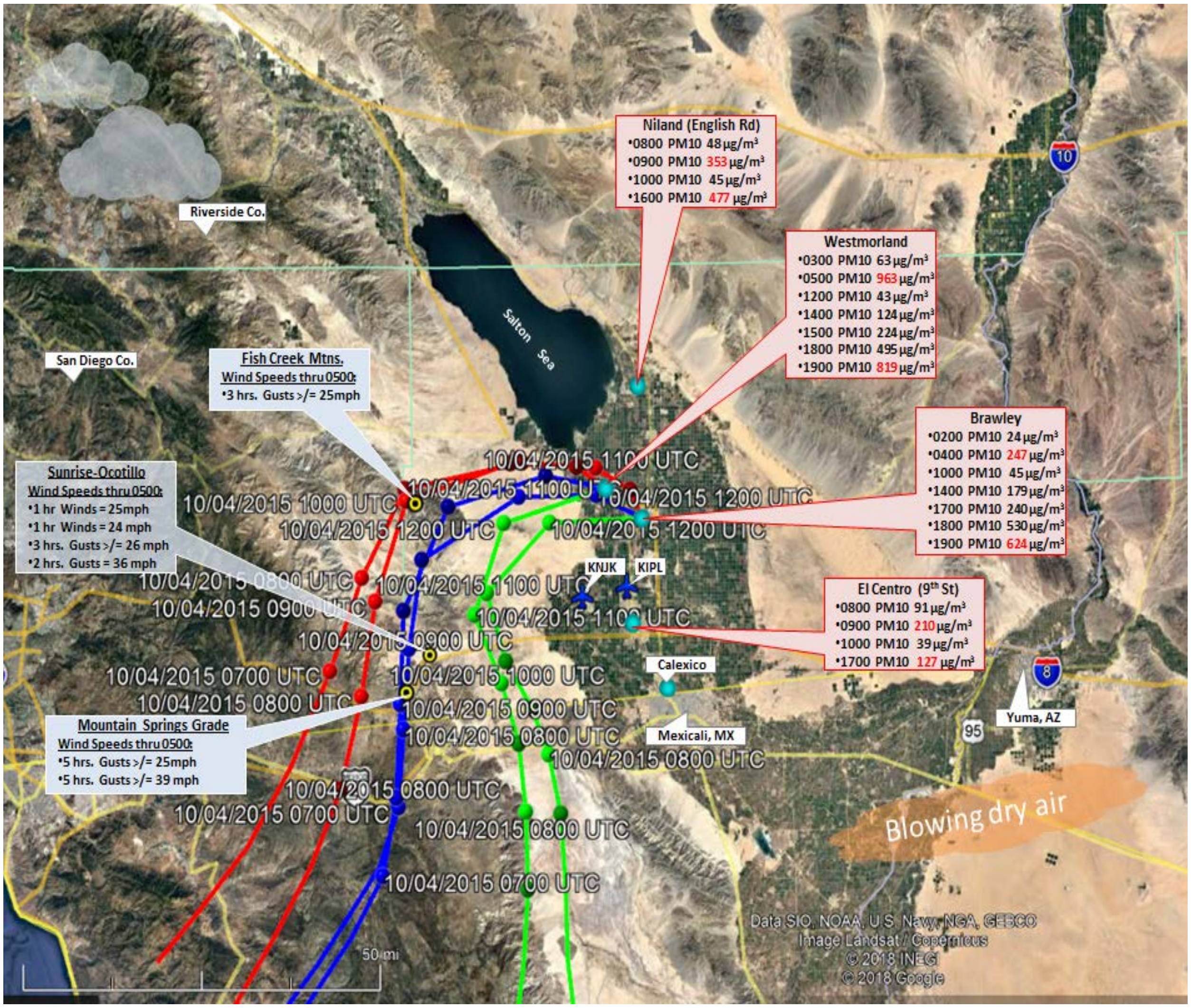


Fig 5-6: A 10-hour back trajectory ending at 0500 PST on October 4, 2015 illustrates the path of airflow before reaching the Brawley and Westmorland monitors. The 0500 hour is coincident with the AM hourly peak concentration at the Westmorland monitor. Concentrations in red indicate peak concentrations during the day. Imperial County airport (KIPL) and El Centro NAF (KNJK) measured their highest winds starting mid-morning on. The red trajectory indicates airflow at 10 meters AGL (above ground level); blue is 100m; and green is 500m. Dynamically generated through NOAA's Air Resources Laboratory. Google Earth base map

FIGURE 5-7
EXCEEDANCE TIMELINE ENDING AT 1900 ON OCTOBER 4, 2015

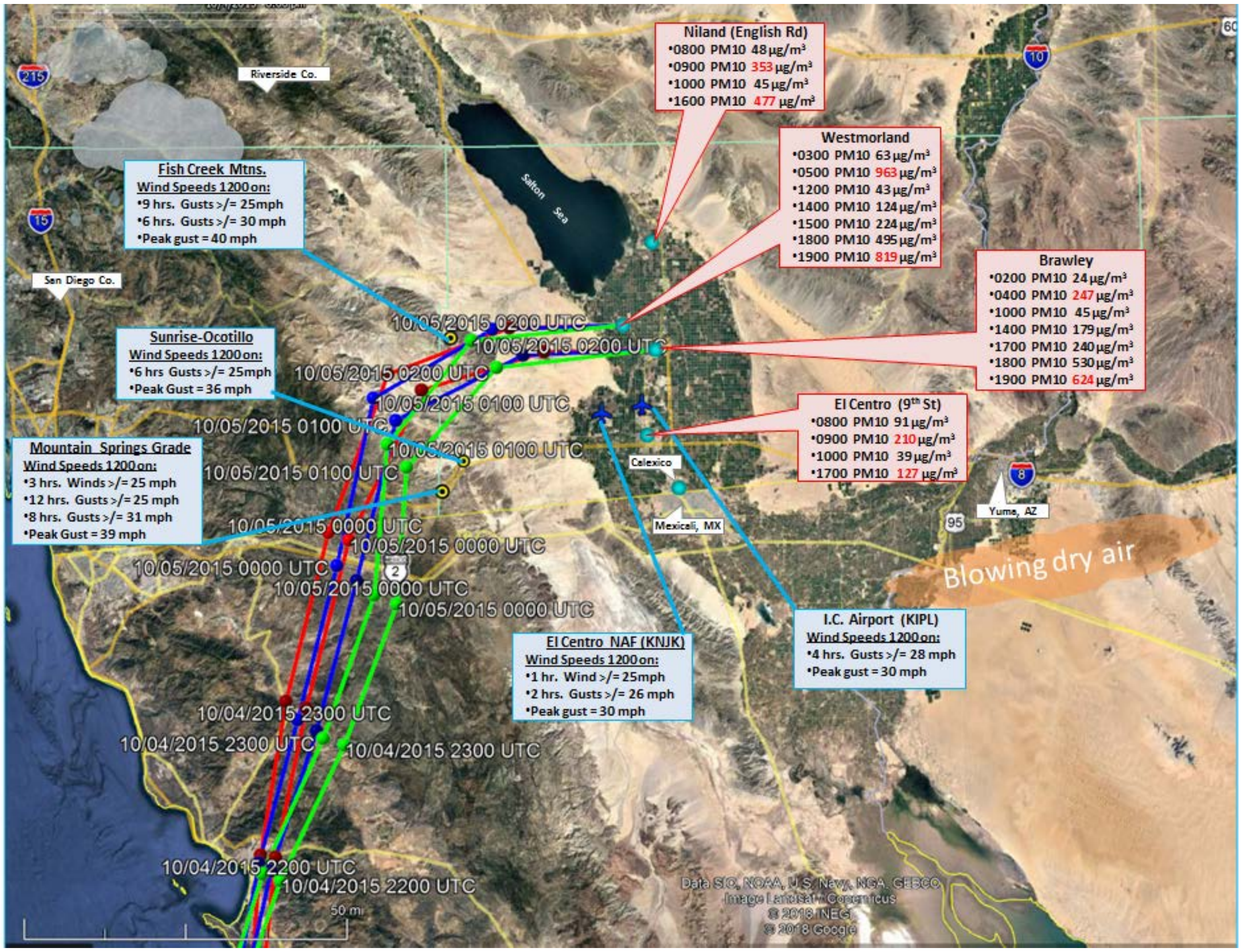


Fig 5-7: A 6-hour back trajectory ending at 1900 PST on October 4, 2015 illustrates the path of airflow before reaching the Brawley and Westmorland monitors. The 1900 hour is coincident with the PM hourly peak concentrations at the Westmorland and Brawley monitors. Top wind speeds are from 1200 through the rest of the day. Concentrations in red indicate peak concentrations during the day. The red trajectory indicates airflow at 10 meters AGL (above ground level); blue is 100m; and green is 500m. Dynamically generated through NOAA's Air Resources Laboratory. Google Earth base map

While both NWS offices agreed that the second system would bring cooling and chances for rain affecting Southern California on Sunday, October 4, 2015, the Phoenix NWS office identified a slower advection north into south central Arizona because of dry air from the west flowing across Central and Northern Baja. This is significant to Imperial County because as elevated wind gusts and rain occurred within the San Diego Mountains, identified in area forecast discussions and preliminary storm precipitation reports, early saturation levels were not sufficient to prevent the transportation of windblown dust into Imperial County. In fact, both NWS offices agreed, in separate discussions, that the heaviest rains would occur late Sunday night into Monday, October 5, 2015. As the trough moved slowly eastward, with the dry air mass flowing from the south northward, heavy rain did not occur at the lower elevations but at the higher mountain elevations and higher deserts late Sunday, October 4, 2015 and into Monday, October 5, 2015. This allowed saturation to occur within the Inland Empire and within south central Arizona. Ultimately, the winds preceding the system continued at moderate levels into Monday, October 5, 2015 with less saltation and deposition occurring causing lower concentrations of PM_{10}. Both NWS offices reported measurable rain and thunderstorm activity within the San Diego Mountains, Riverside County (Inland Empire), Coachella Valley and in Central/Northern Arizona along Gila County and from the Inland Empire to Cajon Pass.

Figures 5-8 through 5-11 demonstrate the temporal relationship between the gusty winds and the transported windblown dust and resulting effect upon air quality in Imperial County. The positive correlation of measured PM_{10} concentrations at air monitors in Imperial County and specifically at the Brawley and Westmorland monitors and the elevated wind speeds on October 4, 2015, indicate that as wind speeds increased so did concentrations of PM_{10}. Please note that meteorological sites within the San Diego Mountains and the El Centro NAF measured wind speeds at or above 25 mph.

The elevated hourly PM_{10} concentrations occurred throughout the day coincident with the associated gusty winds as measured at the different stations in Imperial and San Diego Counties. **Appendix C** contains additional graphs illustrating the relationship between the high PM_{10} concentrations and increased wind speeds from other monitoring sites within Imperial, Riverside, and Yuma counties on October 4, 2015**.**

FIGURE 5-8

BRAWLEY PM_{10} CONCENTRATIONS AND WIND SPEED CORRELATION

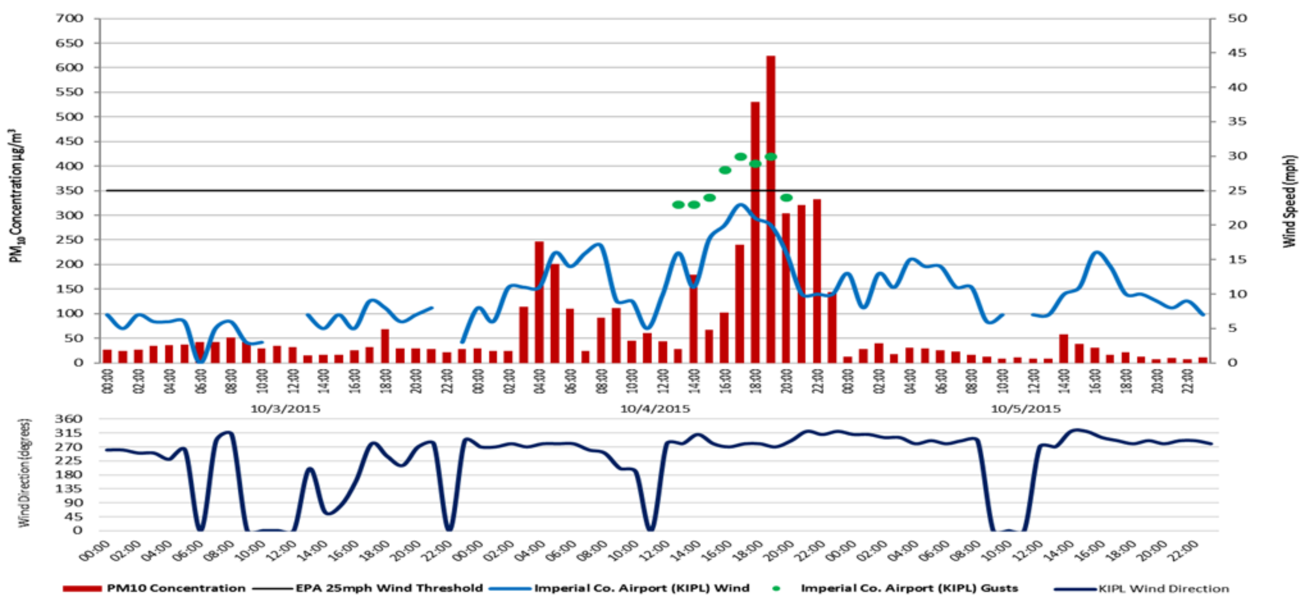


Fig 5-8: Fluctuations in hourly concentrations over 72 hours show a positive correlation with wind speeds, and particularly gusts, at Imperial County Airport (KIPL). Brawley station does not measure wind. Black line indicates 25 mph threshold. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system

Fluctuations in hourly concentrations at the Westmorland site (**Figure 5-9**) over 72 hours shows a positive correlation with wind speeds measured at upstream locations.

FIGURE 5-9
WESTMORLAND PM_{10} CONCENTRATIONS AND WIND SPEED CORRELATION

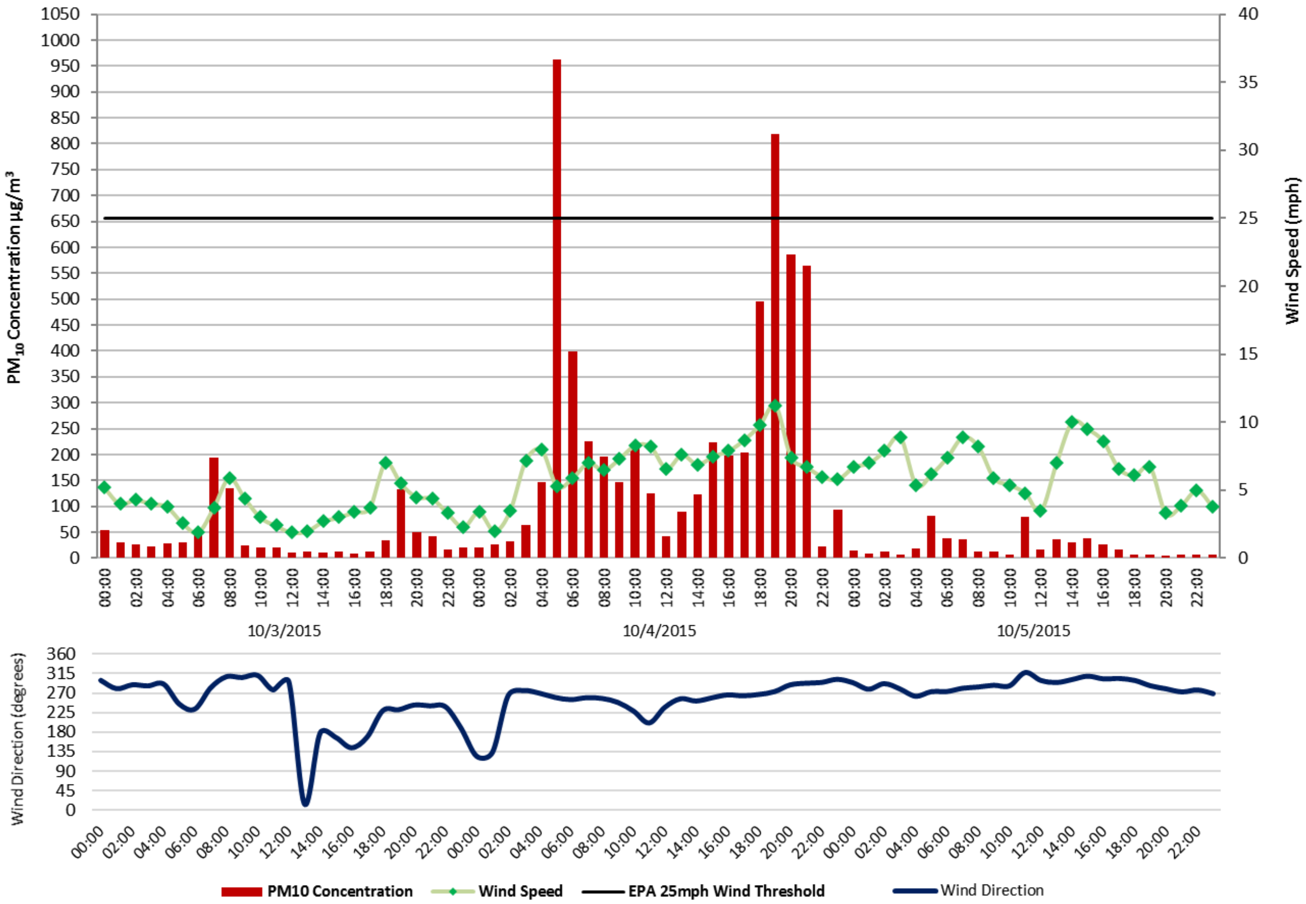


Fig 5-9: Fluctuations in hourly concentrations over 72 hours show a positive correlation with wind speeds at the Westmorland site. The Westmorland station does not measure wind gusts. Black line indicates 25 mph threshold. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system

Figure 5-10 shows hourly concentrations at Brawley and Westmorland along with wind speeds at upstream wind sites. Increasing gusty winds during the early morning hours on October 4, 2015 transported windblown dust resulting in elevated concentrations at the Westmorland and Brawley monitors. A positive correlation can be seen between increases in wind speeds, particularly with gusts, at multiple upstream sites.

FIGURE 5-10
72 HOUR PM_{10} FLUCTUATIONS AND UPSTREAM WIND SPEEDS

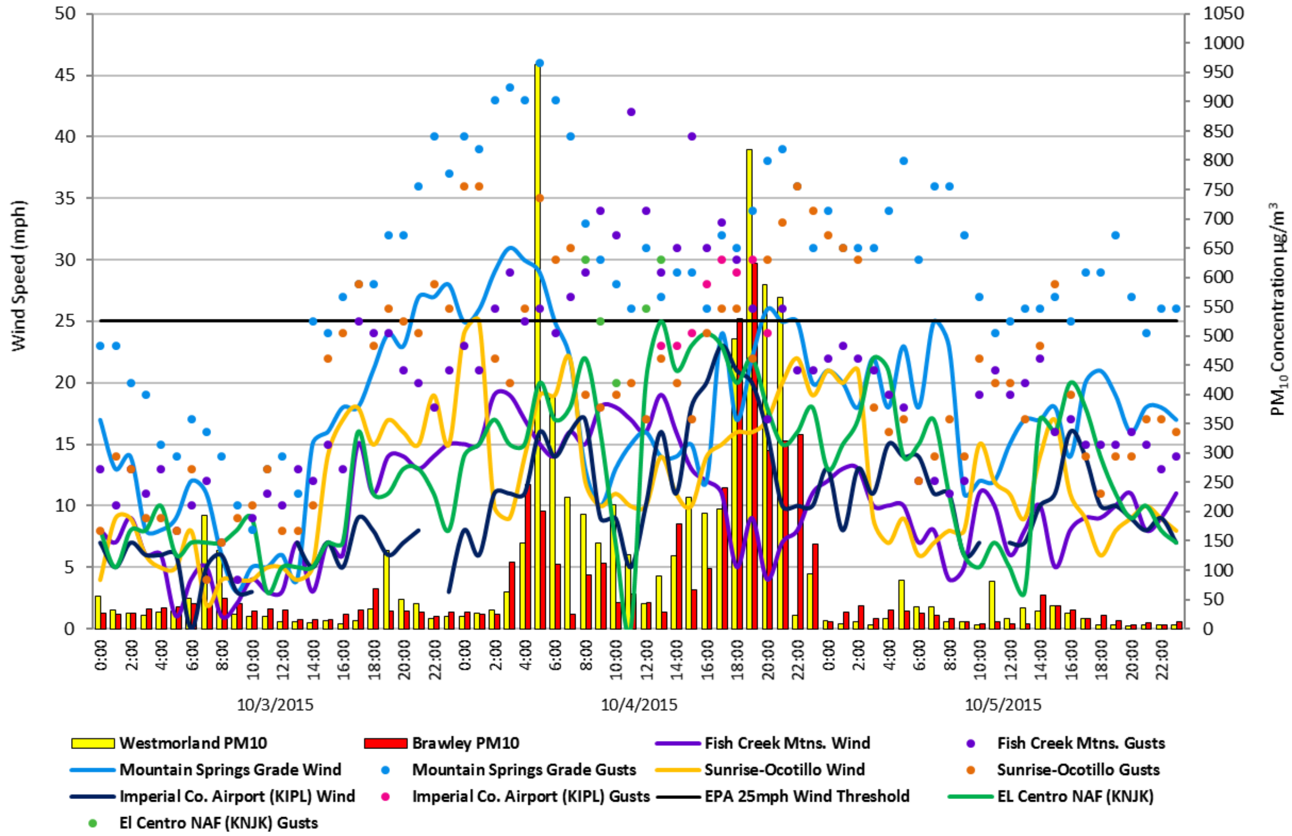


Fig 5-10: The graph illustrates the correlated concentration levels and wind speeds for three days, October 3, 2015 through October 5, 2015. Although winds were elevated within the San Diego Mountains, October 4, 2015 through October 5, 2015, as dry air preceded the heavier rains during the late evening hours of October 4, 2015 and into Monday, October 5, 2015, less saltation and deposition occurred in Imperial County.

The NWS issued a zone forecast for Imperial County on Sunday, October 4, 2015, advising of winds up to 25 mph. A zone forecast for the San Diego deserts, directly upstream of Imperial County, forecasted winds up to 25 mph with gusts of 30 mph, reaching 40 mph by nightfall. Additionally, an Air Quality Forecast warned of “widespread dusts” (see **Appendix A**). **Figure 5-11** is the resultant Air Quality Index (AQI) for October 4, 2015.**Error! Bookmark not defined.** The Air Quality Index for October 4, 2015 remained in the “Good” or “Green” category from 1 a.m. until 10 a.m. The AQI rose to the “Moderate” or “Yellow” category from 11 a.m. to 11 p.m. At 12 a.m., the AQI entered the “Unhealthy for Sensitive Groups” or “Orange” level, confirming that the fugitive dust transported by high winds had impacted the quality of air in Imperial County. This drop in air quality at 12 a.m. and the “carry over” from suspended dust triggered an Air Quality Alert to be issued on October 5 at 1 a.m. by the ICAPCD. **Appendix A** contains copies of notice pertinent to the October 4, 2015 event.

FIGURE 5-11
AIR QUALITY INDEX IN BRAWLEY OCTOBER 4, 2015

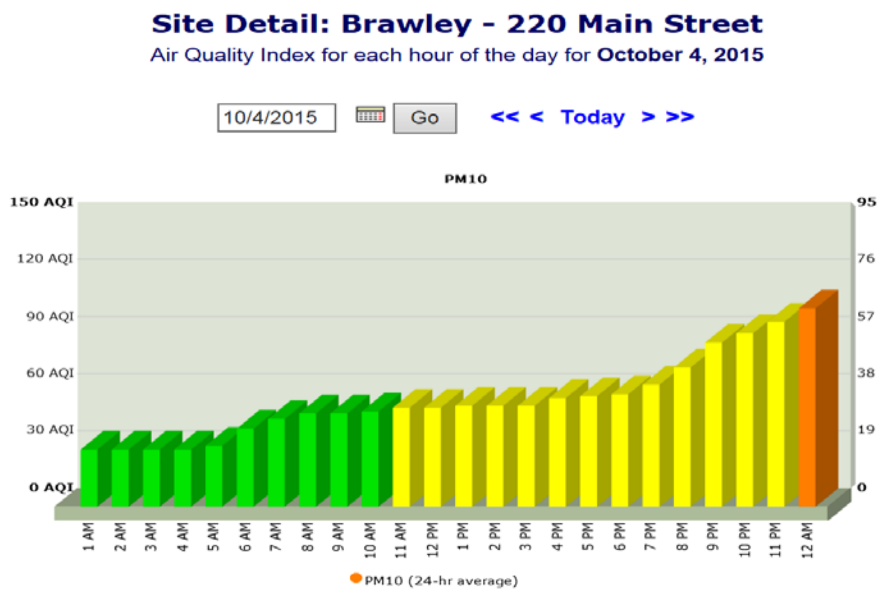


Fig 5-11: Demonstrates that transported windblown dust affected air quality in Imperial County when gusty west winds associated with the passing of a weather system blew particulate matter from areas within the San Diego Mountains downstream into Imperial County on October 4, 2015

V.2 Summary

The preceding discussion, graphs, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the steep pressure gradient accompanying the low-pressure system that passed through the southern region of California. The information provides a clear causal relationship between the entrained windblown dust and the PM_{10} exceedance measured at the Brawley and Westmorland monitors on October 4, 2015. Furthermore, the advisories and air quality index illustrate the affect upon air quality within the region extending from the mountains and desert slopes of San Diego County, all of Imperial County and the southern portion of Riverside County. Large amounts of coarse particles (dust) and PM_{10} transported by strong westerly winds into the lower atmosphere caused a change in the air quality conditions within Imperial County. The entrained windblown dust originated from as far as the mountains and desert slope areas located within San Diego County and Imperial County (part of the Sonoran Desert). Combined, the information demonstrates that the elevated PM_{10} concentrations measured on October 4, 2015 coincided with high wind speeds and that gusty west winds experienced over the southern portion of Riverside County, southeastern San Diego County, all of Imperial County, and parts of Arizona.

FIGURE 5-12
OCTOBER 4, 2015 WIND EVENT TAKEAWAY POINTS

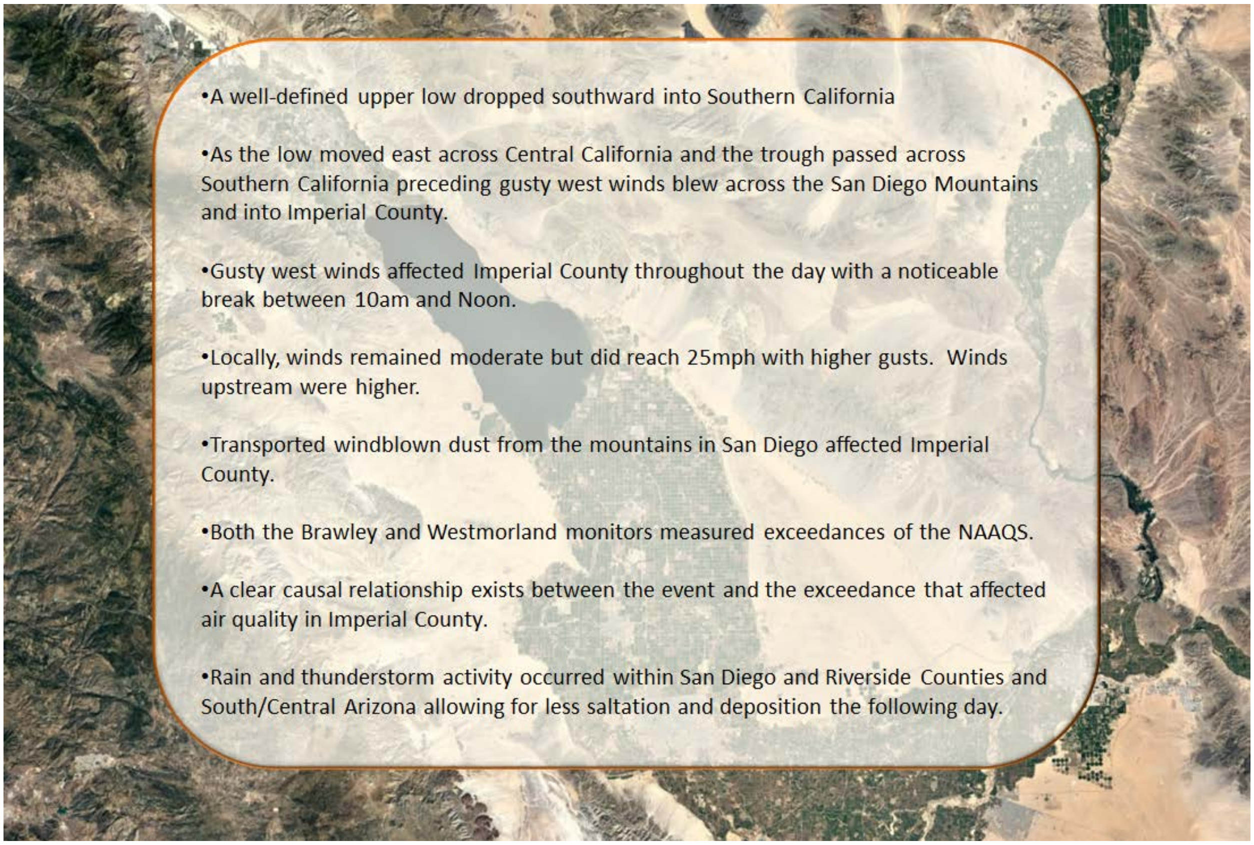


Fig 5-12: Illustrates the factors that qualify the October 4, 2015 natural event which affected air quality as an Exceptional Event

VI Conclusions

The PM_{10} exceedance that occurred on October 4, 2015, satisfies the criteria of the EER, which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})		DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	5-32
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	50-65
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	33-42
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	43-51
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	5-32 & 50-65

VI.1 Affects Air Quality

The preamble to the revised EER states that an event is considered to have affected air quality if it can be demonstrated that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the October 4, 2015 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

Section 50.1(j) of 40 CFR Part 50 defines an exceptional event as an event that must be "not reasonably controllable or preventable" (nRCP). The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. A natural wind event, which transports dust from natural open deserts, meets the nRCP, when sources are controlled by BACM and when human activity plays little to no direct causal role. This demonstration provides evidence that despite BACM in place within Imperial County, strong gusty winds overwhelmed all BACM controls where human activity played little to no direct causal role. The PM_{10} exceedance measured at the Niland monitor caused by naturally occurring strong gusty westerly winds transported windblown dust into Imperial County and other parts of southern California from areas located within the mountains and deserts of San Diego County. These facts provide strong evidence that the PM_{10} exceedance at Brawley and Westmorland on October 4, 2015, were not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a "Natural Event" (50.1(k) of 40 CFR Part 50) is an event with its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. Anthropogenic sources that are reasonably controlled are considered not to play a direct role in causing emissions. As discussed within this demonstration, the PM_{10} exceedances that occurred at Brawley and Westmorland on October 4, 2015, was caused by the transport of windblown dust into Imperial County by strong westerly winds associated with the passage of low-pressure system that moved through the region. At the time of the event, anthropogenic sources were reasonably controlled with BACM. The event therefore qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at Brawley and Westmorland during different days and the comparative analysis of different monitors in Imperial and Riverside Counties demonstrates a consistency of elevated gusty west winds and concentrations of PM10 on October 4, 2015 (Section V). In addition, these time series plots and graphs demonstrate that the high PM10 concentrations and the gusty west winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty west winds. Days immediately before and after the high wind event PM_{10} concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the entrained fugitive emissions to the exceedances on October 4, 2015.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM_{10} values measured at the Brawley and Westmorland monitors were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

This section contains wind advisories issued by the National Weather Service and Imperial County on or around October 4, 2015. The data show a region-wide increase in wind speeds and wind gusts coincident with the arrival of dust and high PM_{10} concentrations in Imperial County. In addition, the **Appendix A supplemental** contains all the NWS notices issued by either the San

Diego or Phoenix office by date and time order

Appendix B: Meteorological Data.

This Appendix contains the time series plots, graphs, wind roses, etc., for selected monitors in Imperial and Riverside counties. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM_{10} Concentrations and Winds.

This Appendix contains the graphs depicting the correlations between PM_{10} Concentrations and elevated wind speeds for selected monitors in Imperial and Riverside counties. These graphs demonstrate the region wide impact of the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule.

This Appendix contains the compilation of the BACM adopted by the Imperial County Air Pollution Control District and approved by the United States Environmental Protection Agency. A total of seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.